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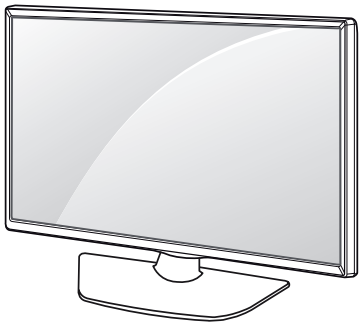
LED TV
SERVICE MANUAL

CHASSIS : LA40A / LD41A

MODEL : 28LB45** 28LB45**-Z*

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL68121902 (1402-REV00)

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SCHEMATIC CIRCUIT DIAGRAM .....

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

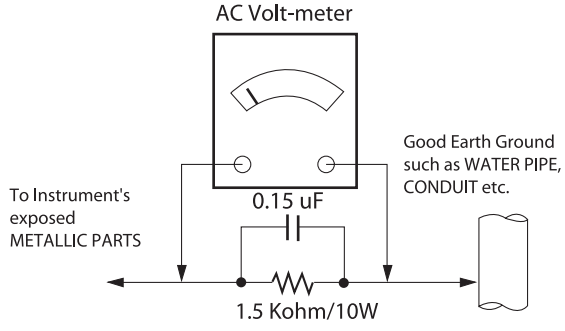
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

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SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

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IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal
1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement
1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement
1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device
Removal/Replacement
1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement
1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor
Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair
Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections
Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

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SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LED TV used LA40A / LD41A chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
2) Relative Humidity: 65 % ± 10 %
3) Power Voltage
   : Standard input voltage (AC 100-240 V~, 50/60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : CE, IEC
   - EMC : CE, IEC

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU/CIS(PAL/DVB Market)	**DTV & Analog (Total 37 countries)** **DTV (MPEG2/4, DVB-T) :37 countries** UK/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/ Belgium/Luxemburg/ Greece/Denmark/Czech/Austria/Hungary /Swiss/Croatia/Turkey/Norway/Slovenia/Poland/Ukraine/ Portugal/Ireland/Morocco/Latvia/Estonia/Lithania/Rumania/ Bulgaria/Russia/SlovakiaBosnia/Serbia/Albania/Kazakhstan/ Belarus *4 Country, Nordic option(EU model only) - Denmark , Finland, Norway, Sweden **DTV (MPEG2/4, DVB-T2): 8 countries** UK/Denmark/Sweden/Finland/Norway/Ireland/Ukraine/Kazakhstan **DTV (MPEG2/4, DVB-C): 37 countries** UK/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/ Belgium/Luxemburg/ Greece/Denmark/Czech/Austria /Hungary/Swiss/Croatia/Turkey/Norway/Slovenia/Poland/Ukraine/ Portugal/Ireland/Morocco/Latvia/Estonia/Lithania/Rumania/ Bulgaria/Russia/Slovakia/Bosnia/Serbia/Albania/Kazakhstan/ Belarus **DTV (MPEG2/4,DVB-S): 29 countries** Italy/Germany/France/Spain/Netherlands/ Belgium/Luxemburg/Greece/ Czech/Austria /Hungary/Swiss/Croatia/Turkey/ Slovenia/Poland/Portugal/ Morocco/Latvia/Estonia/Lithuania/ Rumania/Bulgaria/Russia/SlovakiaBosnia/Serbia/Albania/ Belarus **Supported satellite : 22 satellites** HISPASAT 1C/1D, ATLANTIC BIRD 2, NILESAT 101/102, ATLANTIC BIRD 3, AMOS 2/3, THOR 5/6, IRIUS 4, EUTELSAT-W3A, EUROBIRD 9A, EUTELSAT-W2A, HOTBIRD 6/8/9, EUTELSAT-SESAT, ASTRA 1L/H/M/KR, ASTRA 3A/3B, BADR 4/6, ASTRA 2D, EUROBIRD 3, EUTELSAT-W7, HELLASSAT 2, EXPRESS AM1, TURKSAT 2A/3A, INTERSAT10

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No.	Item	Specification	Remarks
2	Broadcasting system	Analogue TV 1) PAL-BG 2) PAL-DK 3) PAL-I/I' 4) SECAM-BG 5) SECAM-DK 6) SECAM L/L' Digital TV 1) DVB-T/C/T2 Satellite Digital TV 1) DVB-T2/C/S/S2	Analogue TV : (RF) VHF: E2 to E12, UHF : E21 to E69 (CATV) S1 to S20, HYPER: S21 to S47 Digital TV : VHF, UHF Satellite TV : VHF, UHF, C-Band, Ku-Band * DVB-T2 (T2 model only support) * DVB-S/S2 (Satellite model only support)
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM, QAM	► DVB-T - Guard Interval(Bitrate_Mbit/s)B : 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► DVB-T2 - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256, - Modulation : Code Rate QPSK : 1/2, 2/5, 2/3, 3/4, 5/6 16-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 64-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 256-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 ► DVB-C - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM ► DVB-S/S2 - symbolrate DVB-S2 (8PSK / QPSK) : 2 ~ 45 Msymbol/s DVB-S (QPSK) : 2 ~ 45 Msymbol/s - viterbi DVB-S mode : 1/2, 2/3, 3/4, 5/6, 7/8 DVB-S2 mode : 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10
4	Interface	RF / Composite / Component(CVBS) / HDMI / USB / Headphone Out / Scart	
5	DVB	DVB-T	CI : UK, Finland, Denmark, Norway, Sweden, Russia, Spain, Ireland, Luxemburg, Belgium, Netherland CI+ : France(Canal+), Italy(DGTVi)
		DVB-C	CI : Switzerland, Austria, Slovenia, Hungary, Bulgaria CI+ : Switzerland(UPC,Cablecom), Netherland(Ziggo), Germany(KDG,CWB), Finland(labwise)
		DVB-S	CI+ : Germany(Austria HD+)

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5. External Input Support Format

5.1. RGB/HDMI (PC)

No.	Specification				Remark
	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	
1.	720*400	31.468	70.080	28.321	
2.	640*480	31.469	59.940	25.175	
3.	640*480	37.500	75.000	31.500	
4.	800*600	37.879	60.317	40.000	
5.	800*600	46.875	75.000	49.500	
6.	1024*768	48.363	60.004	65.000	
7.	1024*768	60.023	75.029	78.750	
8.	1280*800	49.702	59.810	83.500	
9.	1366*768	47.717	59.79	85.5	

5.2. HDMI (DTV)

No.	Specification				Remark
	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	
1.	720*480	31.469 31.5000	59.940 60.000	27.000 27.030	SDTV 480P
2.	720*576	31.250	50.000	27.864	SDTV 576P
3.	1280*720	37.500	50.000	74.250	HDTV 720P
4.	1280*720	44.960 45.000	59.940 60.000	74.170 74.250	HDTV 720P
5.	1920*1080	33.720 33.750	59.940 60.000	74.170 74.250	HDTV 1080I
6.	1920*1080	28.125	50.000	74.250	HDTV 1080I
7.	1920*1080	27.000	24.000	74.250	HDTV 1080P
8.	1920*1080	33.750	30.000	74.250	HDTV 1080P
9.	1920*1080	56.250	50.000	148.500	HDTV 1080P
10.	1920*1080	67.430 67.500	59.940 60.000	148.350 148.500	HDTV 1080P

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5.3. Component

No.	Specification		
	Resolution	H-freq(kHz)	V-freq.(Hz)
1.	720x480	15.73	59.94
2.	720x480	15.73	60
3.	720x480	31.47	59.94
4.	720x480	31.5	60
5.	1280x720	44.96	59.94
6.	1280x720	45	60
7.	1920x1080	33.72	59.94
8.	1920x1080	33.75	60
9.	1920x1080	26.97	23.976
10.	1920x1080	27	24
11.	1920x1080	33.71	29.97
12.	1920x1080	33.75	30
13.	1920x1080	67.432	59.94
14.	1920x1080	67.5	60

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ADJUSTMENT INSTRUCTION

1. Application Range

This document is applied to LA40A / LD41A chassis LED TV which is manufactured in TV(or Monitor) Factory or is produced on the basis of this data.

2. Designation

1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
2) Power adjustment : Free Voltage.
3) Magnetic Field Condition: Nil.
4) Input signal Unit: Product Specification Standard.
5) Reserve after operation: Above 5 Minutes (Heat Run)
   Temperature : at 25 °C ± 5 °C
   Relative humidity : 65 % ± 10 %
   Input voltage : 110-240 V, 50/60 Hz
6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), DDC Adjustment Jig equipment, Service remote control.
7) Push the "IN STOP KEY" - For memory initialization.

Case1 : Software version up
1. After downloading S/W by USB , TV set will reboot automatically.
2. Push “In-stop” key.
3. Push “Power on” key.
4. Function inspection
5. After function inspection, Push “In-stop” key.

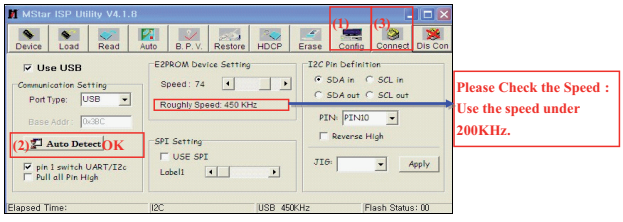
Case2 : Function check at the assembly line
1. When TV set is entering on the assembly line, Push “In-stop” key at first.
2. Push “Power on” key for turning it on.
   → If you push “Power on” key, TV set will recover channel information by itself.
3. After function inspection, Push “In-stop” key.

3. Main PCB check process

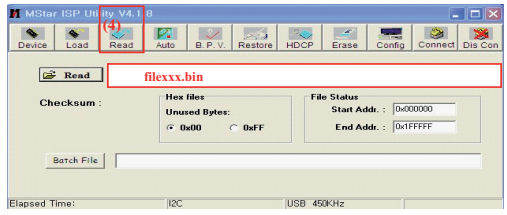
* APC - After Manual-Insult, executing APC

3.1. Boot file Download

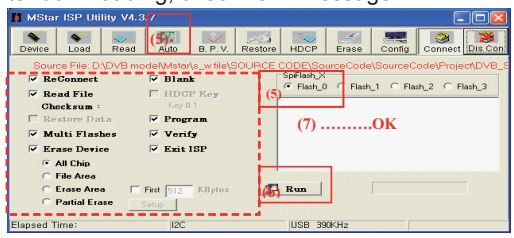
(1) Execute ISP program “Mstar ISP Utility” and then click “Config” tab.
(2) Set as below, and then click “Auto Detect” and check “OK” message. If display “Error”, Check connect computer, jig, and set.
(3) Click “Connect” tab. If display “Can’t”, Check connect computer, jig, and set.



4) Click “Read” tab, and then load download file(XXXX.bin) by clicking “Read”.



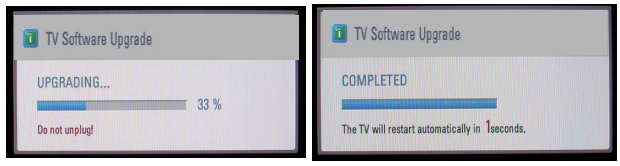
5) Click “Auto” tab and set as below
6) Click “Run”.
7) After downloading, check “OK” message.



3.2. USB DOWNLOAD(*.epk file download)

(1) Make New folder named “LG_DTV” and put ISP file(*.epk) in the folder.
(2) Put the USB Stick to the USB socket.
(3) Automatically detecting update file in USB Stick
   - If your downloaded program version in USB Stick is Low, it didn’t work.
   - But your downloaded version is High, USB data is automatically detecting
(4) Show the message "Copying files from memory"

(5) Updating is starting.



(6) Updating Completed, The Multi-vision will restart automatically.
(7) If your TV is turned on, check your updated version and Tool option.(refer to next page tool option section)
   * If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn’t have a DTV/ATV test on production line.

* After downloading, have to adjust TOOL OPTION again.

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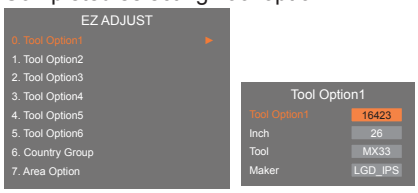
3.3. Tool option Selection

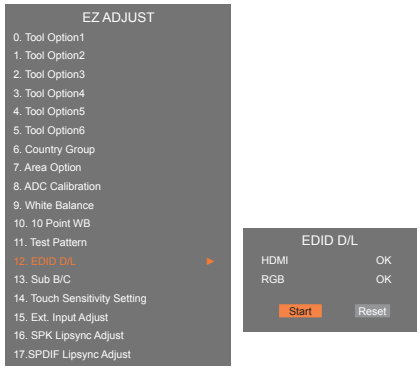
(1) Push "ADJ" key in service remote control.
(2) Select "Tool Option 1" and Push “OK” button
(3) Punch in the number. (Each model has their number.)
(4) Completed selecting Tool option.



3.4. EDID Process

3.4.1. EDID download

(1) Press "Power only" key of service remote control.
(2) Press the "ADJ" key of service remote control.
(3) Enter EDID D/L mode by pushing "►" key at "12. EDID D/L".
(4) Select “Start” menu to download EDID data.
(5) Check the "OK" message.
(6) Press EXIT key on service remote control.



<Caution>
- Do not connect HDMI & D-sub Cable when download EDID.

* Edid data and Model option download (RS232)

No.	Item	CMD 1	CMD 2	Data 0		
Enter download MODE	Download ‘Mode In’	A	A	0	0	When transfer the ‘Mode In’, Carry the command.
EDID data and Model option download	Download	A	E	00	10	Automatically download (The use of a internal Data)

<Caution>
* Use the proper signal cable for EDID Download
- Analog EDID : Pin3 exists
- Digital EDID : Pin3 exists

3.4.2. HDMI1 EDID Data - Checksum : 98 CE

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	CA	59	01	01	01	01
0x01	01	17	01	03	80	33	1D	78	EA	62	75	A3	55	4F	A0	27
0x02	12	50	54	A7	6A	00	31	4F	45	4F	61	4F	81	00	01	01
0x03	01	01	01	01	01	01	66	21	56	AA	51	00	1E	30	46	8F
0x04	33	00	FD	1E	11	00	00	1E	00	00	00	FD	00	38	4B	1E
0x05	3D	09	00	0A	20	20	20	20	20	20	00	00	00	FC	00	32
0x06	44	20	48	44	20	4C	47	20	54	56	0A	20	00	00	00	FF
0x07	00	0A	20	20	20	20	20	20	20	20	20	20	20	20	01	98

128 B | 256 B | Summary

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	02	03	21	F1	4E	84	05	03	02	20	22	10	11	13	12	14
0x01	1F	07	16	26	15	07	50	09	07	07	66	03	0C	00	10 ****	00
0x02	80	01	1D	00	72	51	D0	1E	20	38	88	15	00	56	50	21
0x03	00	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	56
0x04	50	21	00	00	9E	01	1D	80	D0	72	1C	16	20	10	2C	25
0x05	80	C4	8E	21	00	00	9E	02	3A	80	D0	72	38	2D	40	10
0x06	2C	45	20	06	44	21	00	00	1E	02	3A	80	18	71	38	2D
0x07	40	58	2C	45	00	56	50	21	00	00	1E	00	00	00	00	CE ****

3.5. Function Check

3.5.1. Check display and sound

*Check Input and Signal items. (cf. work instructions)
1) TV
2) AV (SCART/CVBS)
3) COMPONENT (480i)
4) HDMI(PC : 1366 x 768 @ 60Hz)
* Display and Sound check is executed by Remote control

<Caution> Not to push the INSTOP key after completion if the function inspection.

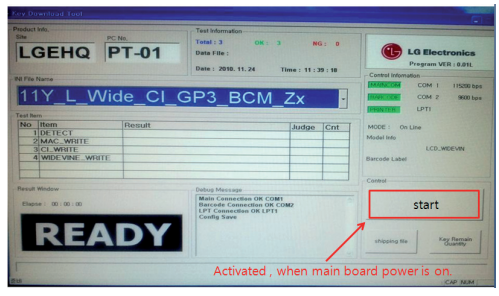
3.6. CI+ key writing process(Device CN)

3.6.1. Communication Port Connection

Connection : PCBA(USB Port) → USB to Serial Adapter(UC-232A) → RS-232C cable → PC(RS-232C port)

3.6.2. CI+ Key Download

(1) Set CI+ Key path Directory at Start Mac & CI+ Download Programme.
(2) Set COM 1,2,3,4 / 115200(Baudrate)
(3) Click port connection button.
(4) Start CI+ Key Download, Push the button.
(5) Check OK or NG
(6) After completing download, CI + key values are increase by one automatically. To write CI+ key next SET, click CI+ key writing button directly.
(7) Check whether the key was downloaded or not at ‘In Start’ menu. (Refer to below).



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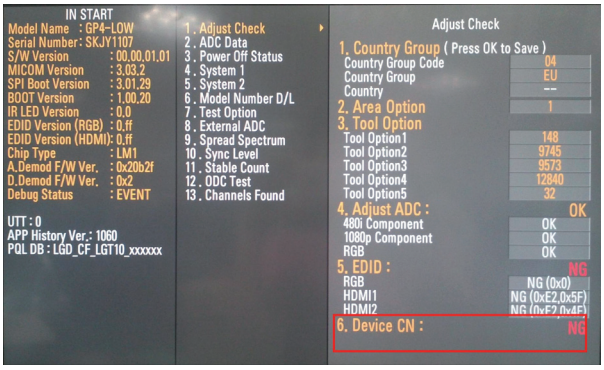
3.6.3. Check the Download to CI+ Key value in LG set.

(1) Check the method of CI+ Key value.

1) Check the method on Instart menu.



(2) Check the method of CI+ key value(RS232)

1) Into the main ass'y mode(RS232: aa 00 00)

CMD 1	CMD 2	Data 0	
A	A	0	0

2) Check the mothed of CI+ key by command (RS232: ci 00 20)

CMD 1	CMD 2	Data 0	
C	I	2	0

3) Result value

i 01 OK 1d1852d21c1ed5dcx

→ CI+ Key Value

4. Total Assembly line process

4.1. Tool option & ADC Check

(1) Press "Power on" key of service remote control.

(2) Connect RS232 Signal Cable to RS-232 Jack.

(3) Check the 'Tool Option'(Refer to the BOM Comments or Adjustment spec.)

(4) Check the 'ADC' is ok.

4.2. Model name & Serial number download

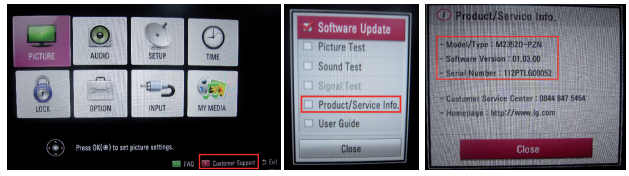
4.2.1. Model name & Serial number D/L

1) Press "Power on" key of service remote control.

2) Connect RS232 Signal Cable to RS-232 Jack.

3) Write Model Name & Serial Number by use RS-232.

4) Must check the serial number at the Diagnostics of SET UP menu. (Refer to below.)



4.2.2. Method & notice

(1) Model Name & Serial Number D/L is using of scan equipment.

(2) Setting of scan equipment operated by Manufacturing Technology Group.

(3) Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

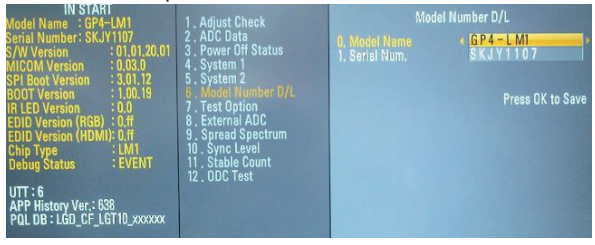
*Manual Download (Model Name and Serial Number)

If the TV set is downloaded By OTA or Service man, Sometimes model name or serial number is initialized. (Not always) There is impossible to download by bar code scan, so It need Manual download.

1) Press the 'Instart' key of ADJ remote control.

2) Go to the menu '6.Model Number D/L' like below photo.

3) Input the Factory model name(ex 24LB4500) or Serial number like photo.



4) Check the model name Instart menu. → Factory name displayed.

5) Check the Diagnostics. (DTV country only) → Buyer model displayed.

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4.3. Function Check

4.3.1. Check display and sound

■ Check Input and Signal items. (cf. work instructions)
1) TV
2) AV (SCART/CVBS)
3) COMPONENT (480i)
4) HDMI(PC : 1366 x 768 @ 60Hz)
* Display and Sound check is executed by Remote control
* Caution : Not to push the INSTOP KEY after completion if the function inspection.

4.3.2. PCMCIA CARD Check

You must adjust DTV 29 Channel and insert PCMCIA CARD to socket.
- If PCMCIA CARD works normally, video signals will appear on screen. But it works abnormally, "No CA module" will appear on screen.

* Caution: Set up "RF mode" before launching products.

4.4. White balance adjustment

(Do not adjust white balance)

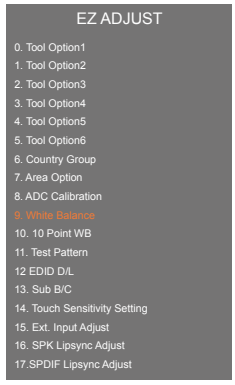
(1) Equipment
1) Color Analyzer: CA-210 (LED Module : CH 14)
2) Adj. Computer(During auto adj., RS-232C protocol is needed)
3) Adjust Remote control

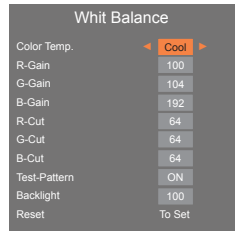
RGB Gains are fixed data for each model.
Insert RS-232C Jack which is connected with PC for White Balance or equivalent device.
→ Total Assembly line should be check whether the color coordinate(x,y) data refer to below table were meet or not.
Color coordinate is differ from panel's characteristics of color temperature. Please check panel characteristics about color temperature
- Cool Panel

Color Temperature	Cool	13,000	K	X=0.276 (±0.04) Y=0.275 (±0.04)	<Test Signal> Inner pattern (204gray,80IRE)
	Medium	9,300	K	X=0.290 (±0.04) Y=0.298 (±0.04)	
	Warm	6,500	K	X=0.318 (±0.04) Y=0.334 (±0.04)	
Luminance (cd/m²)	Cool	Min : 80	K	Typ : 110	<Test Signal> Inner pattern (204gray,80IRE)
	Medium	Min : 80	K	Typ : 110	
	Warm	Min : 70	K	Typ : 110	

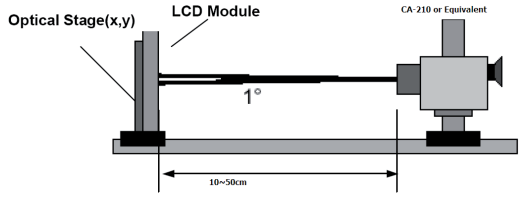
* Note : x,y coordinates are drifted about 0.007 after 30 mins heat-run. So checking color coordinate within 5-min at total assembly line, consider x,y coordinates might be up to 0.007 than x,y target of each color temperature.

* Note : Manual W/B process using adjusts Remote control.
1) After enter Service Mode by pushing "ADJ" key,
2) Enter "White Balance" by pushing "►" key at "9. White Balance".





* When doing Adjustment, Please make circumstance as below.



4.5. DPM Operation check

■ Measurement Condition: 100~240V@ 50/60Hz
(1) Set Input to HDMI (with Input Label set to PC) and connect HDMI cable to set - HDMI Mode
(2) Cut off H sync or V sync of signal.
(3) Check DPM operation refer to the below table.

Operating Condition		Sync(H/V)	Video	LED(SET)	Wattage(W)
Power S/W On	Sleep mode - RGB, HDMI	Off/Off	Off	Amber	1

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4.6. Model name & SW version & Adjust check

* Press the ‘Instart’ key of ADJ remote control.

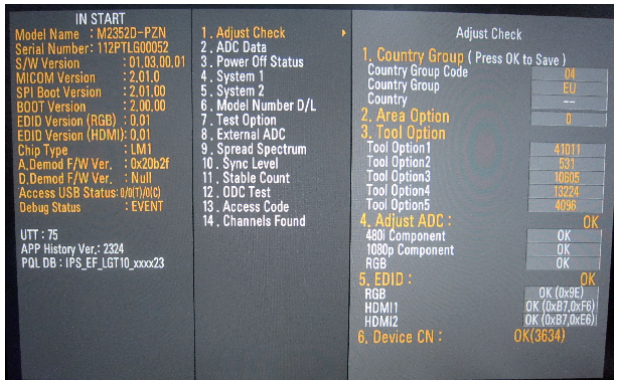
4.6.1. Model Name& SW Version Check

1) Check ‘Model Name’.
2) Check ‘S/W Version’ (Refer to the IC Ver. in the BOM)

4.6.2. Adjust Check

1) Check ‘Country Group’
2) Check ‘Area Option’
3) Check ‘Tool Option’ (Refer to the BOM Comments)
4) Check ‘EDID[RGB&HDMI]’ is OK.

* After check all, Press the 'EXIT' key of ADJ remote control to go out SVC menu.



4.7. Outgoing condition Configuration

* After all function test., press IN-STOP key by SVC Remote control. And make Outgoing Condition.

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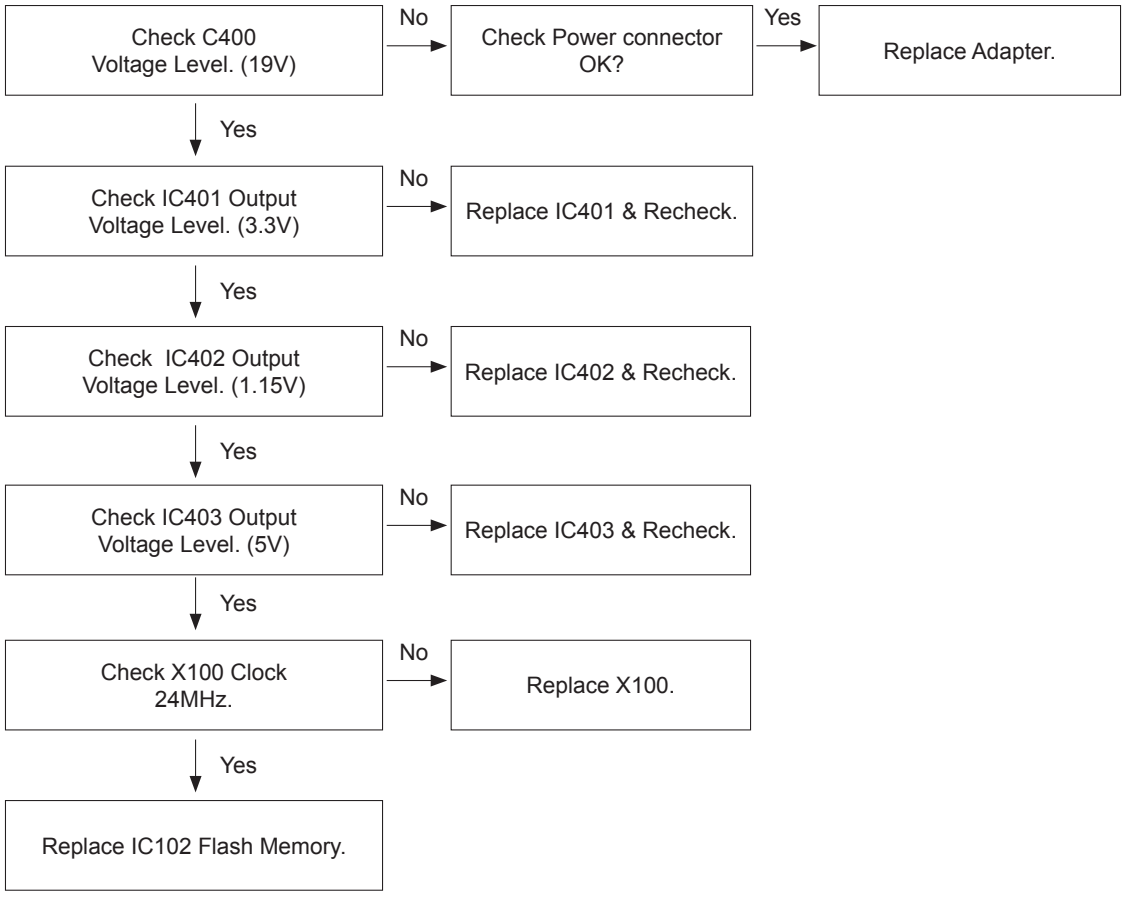
TROUBLE SHOOTING

1. No Power



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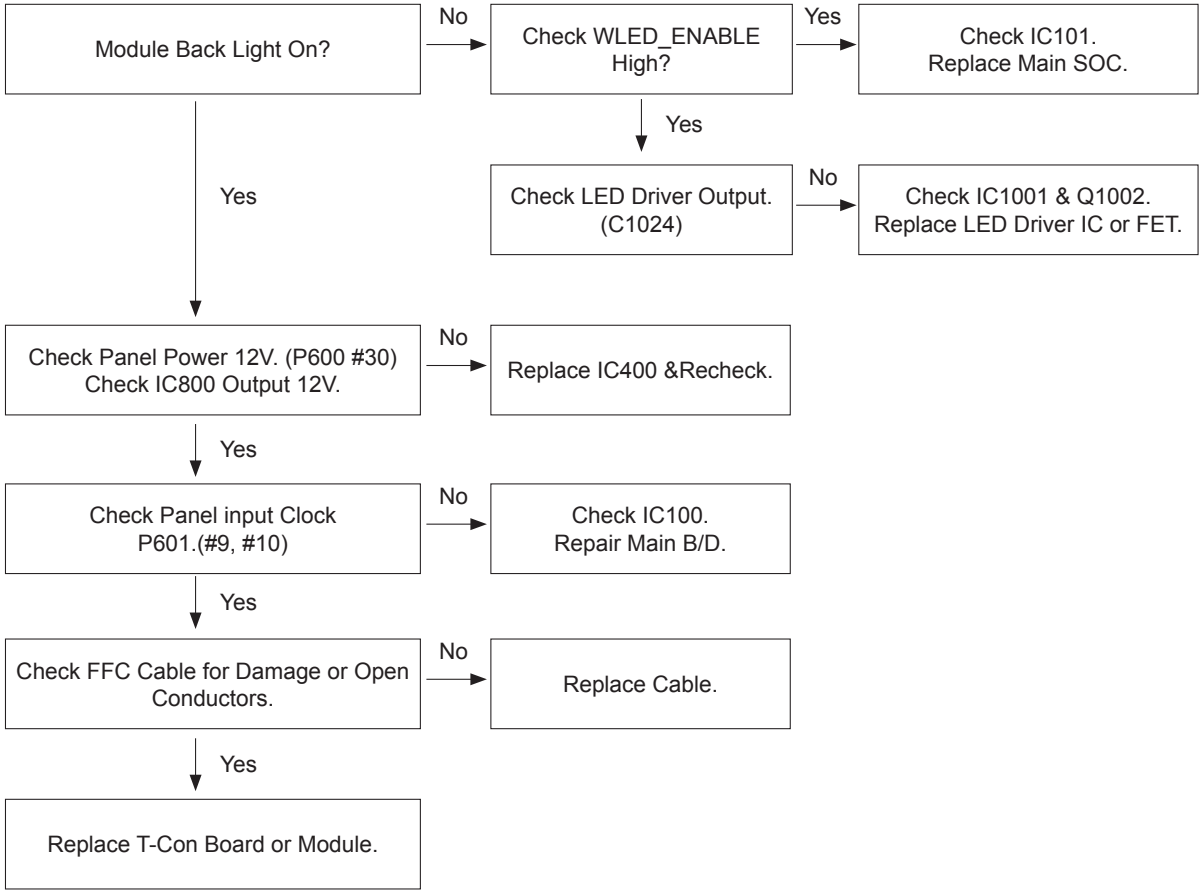
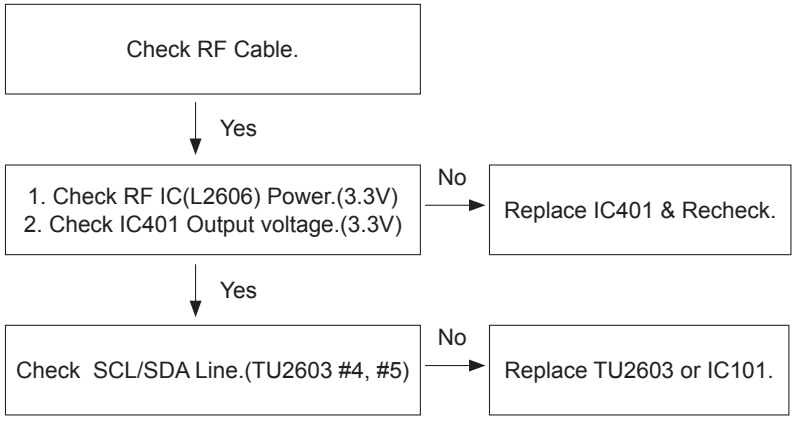
2. No Screen on



3. No Video - Digital TV



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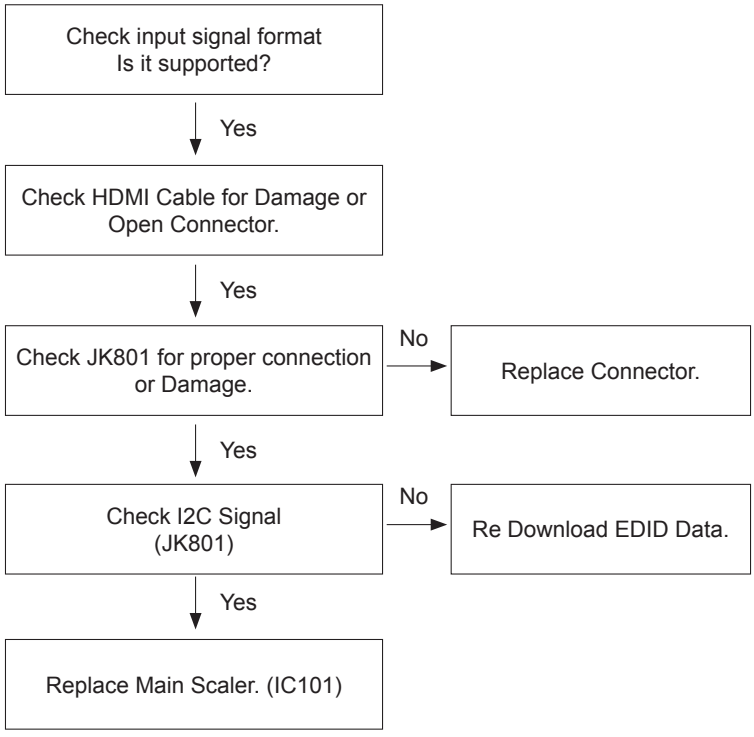
4. No Video - HDMI



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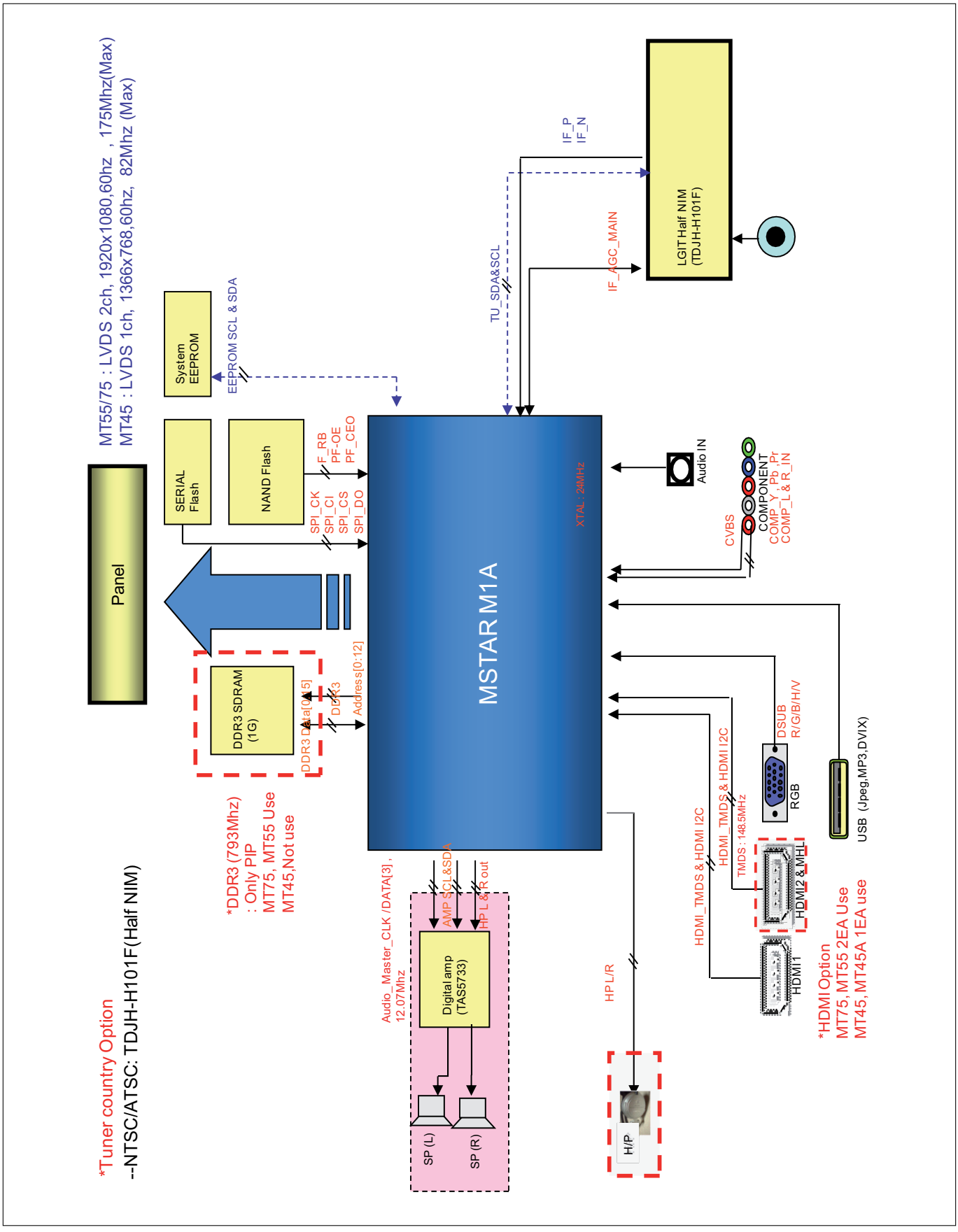
BLOCK DIAGRAM



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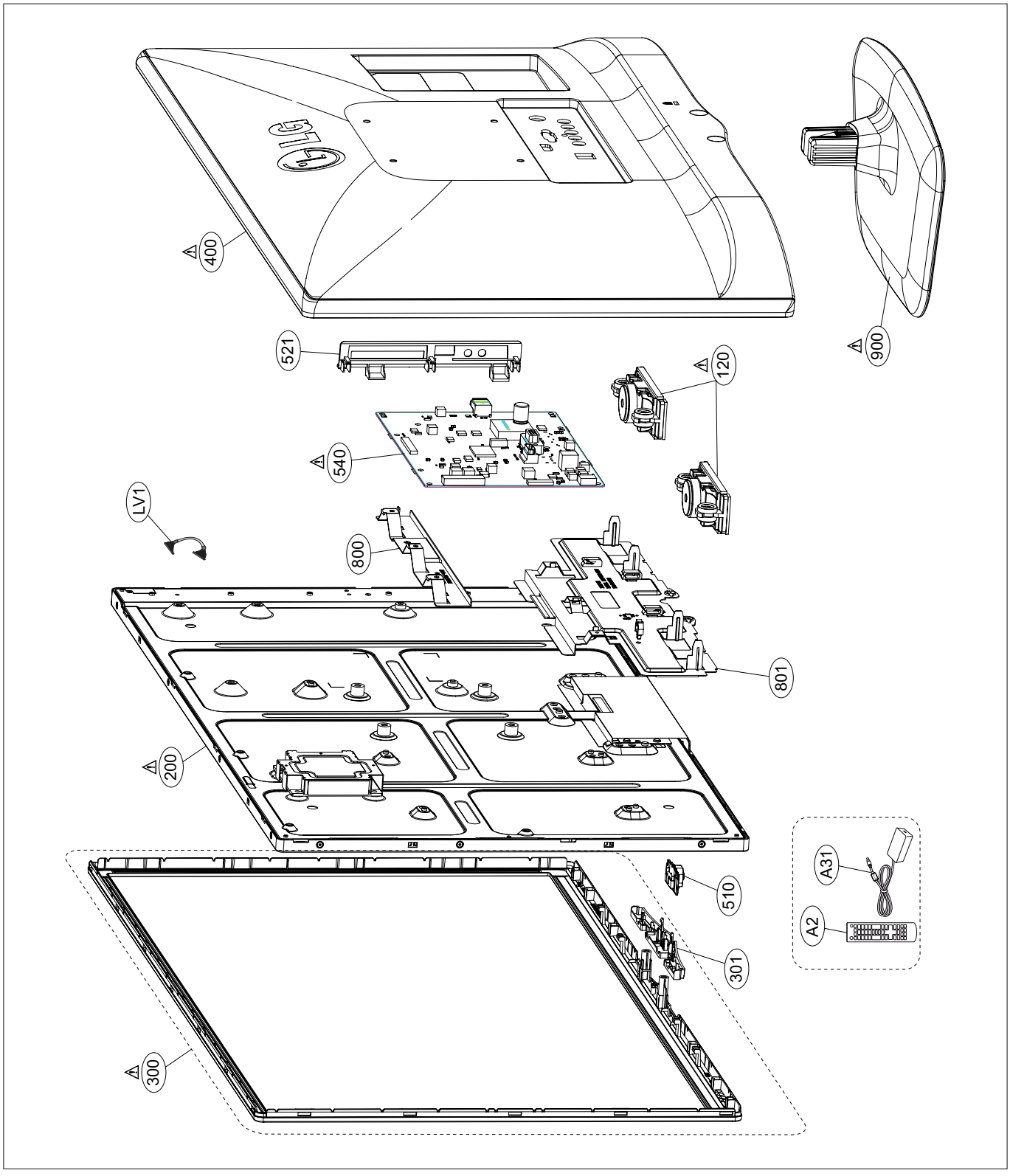
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



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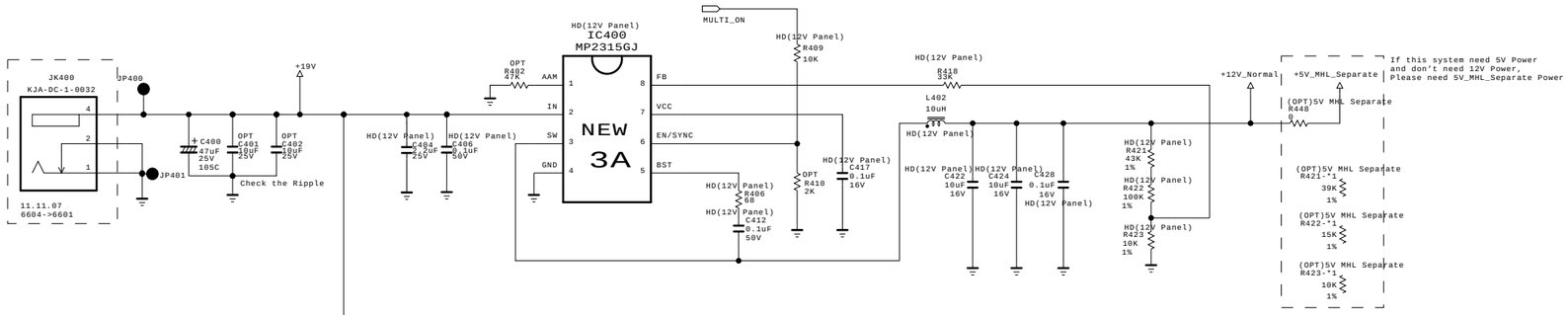
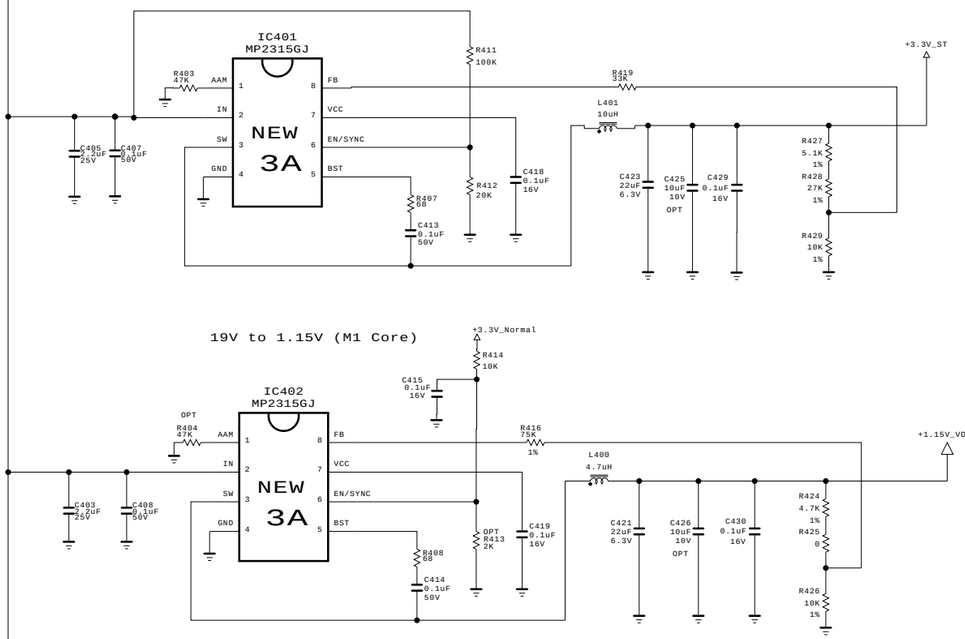
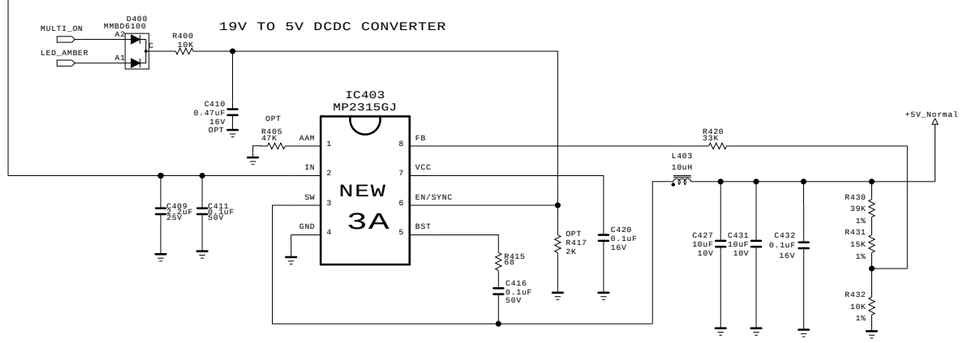
19V to 12V (For HD Panel)

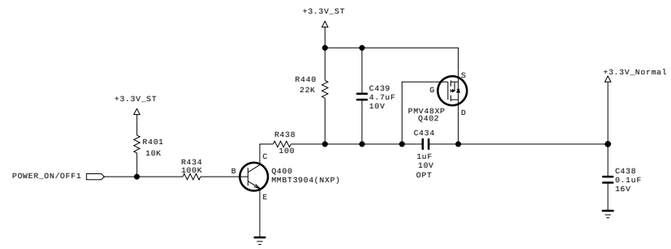




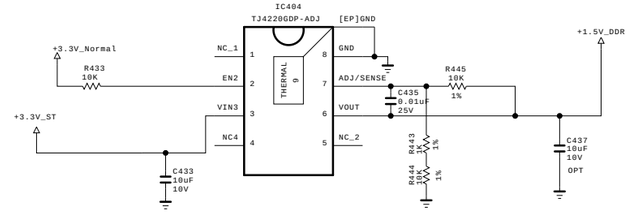
19V to 1.15V (M1 Core)

19V TO 5V DCDC CONVERTER

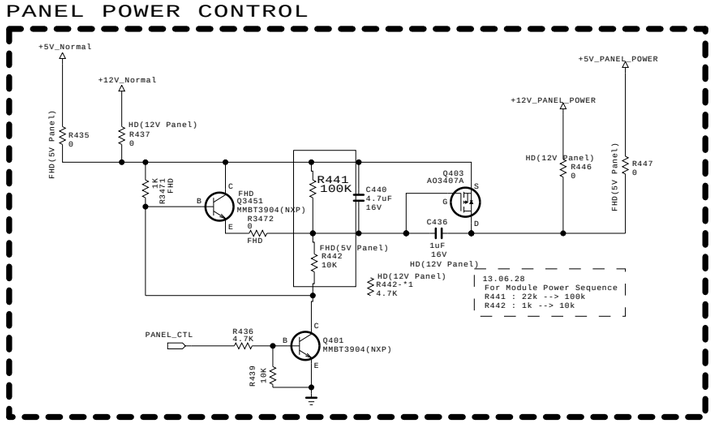




3.3V TO 1.5V LDO(DDR Power)



PANEL POWER CONTROL



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	MT45	DATE	2013/09/13
BLOCK	POWER	SHEET	1 / 12

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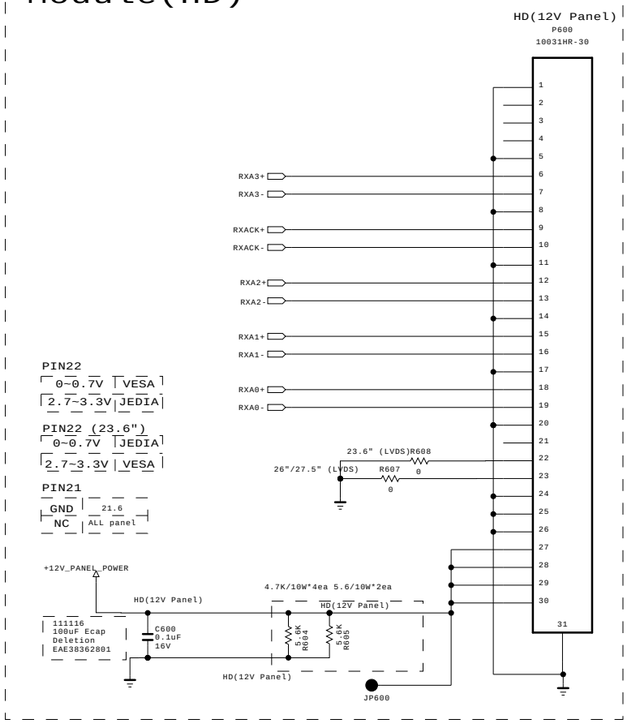
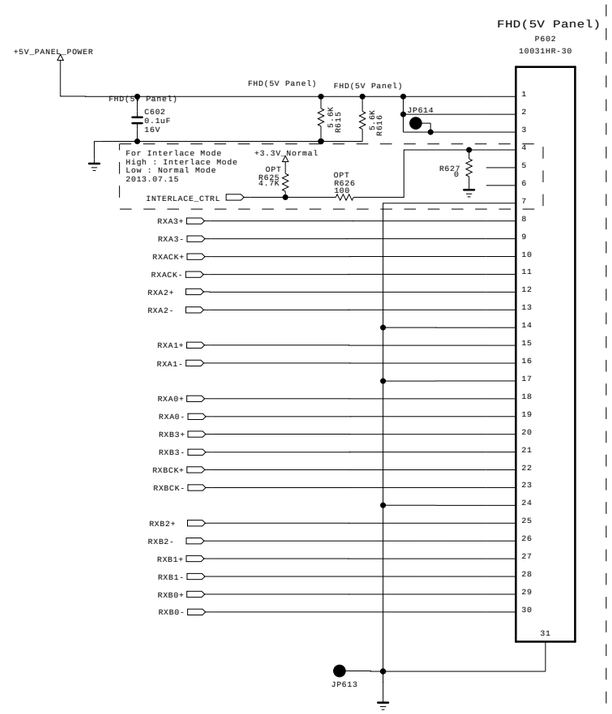
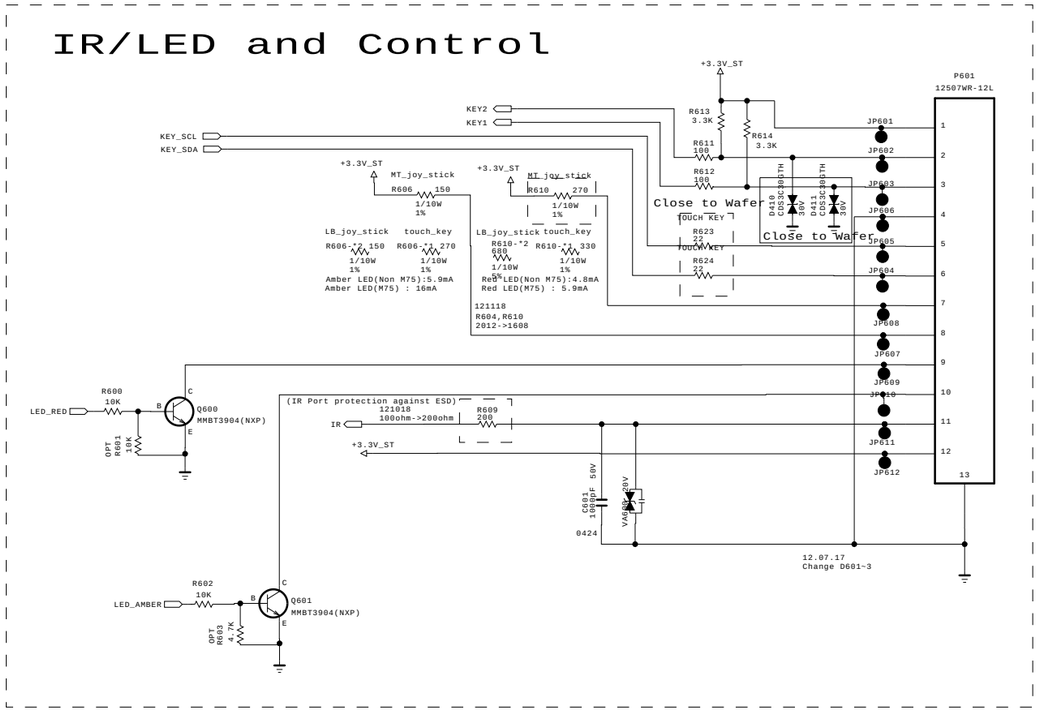
Module(HD)



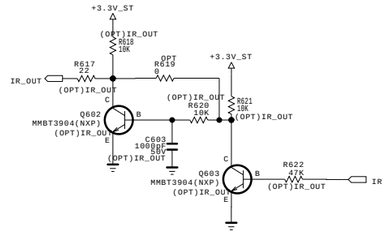
Module(FHD)



IR/LED and Control



IR_OUT(Ready)



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	MA55	DATE	2013/05/23
BLOCK	IR/CONTROL/MODULE	SHEET	6

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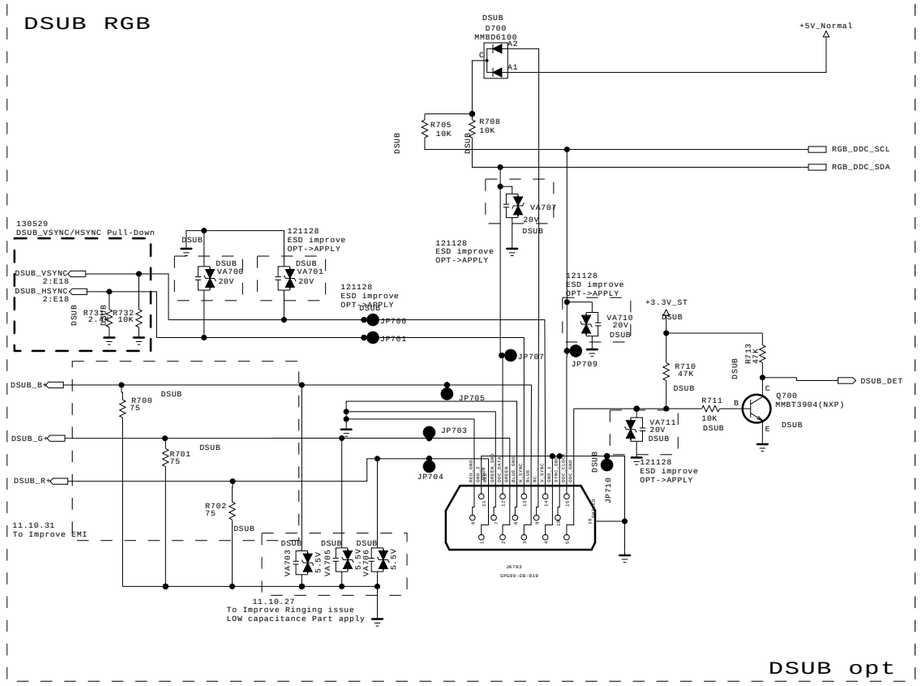
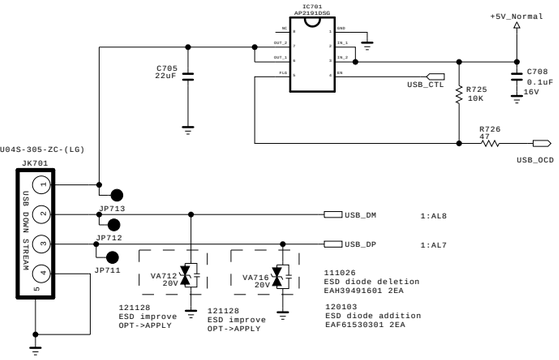
DSUB RGB

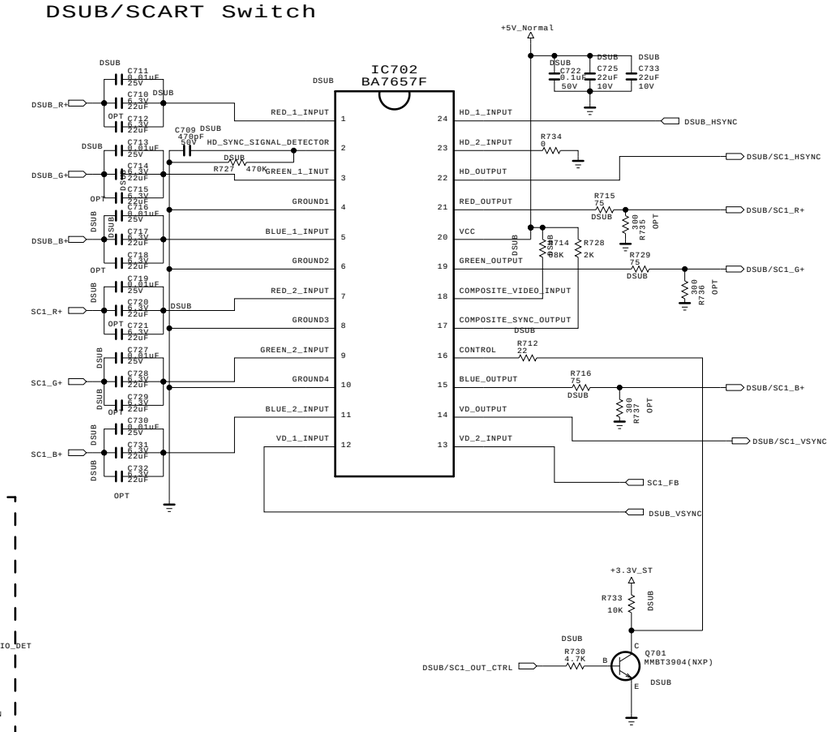


DSUB opt

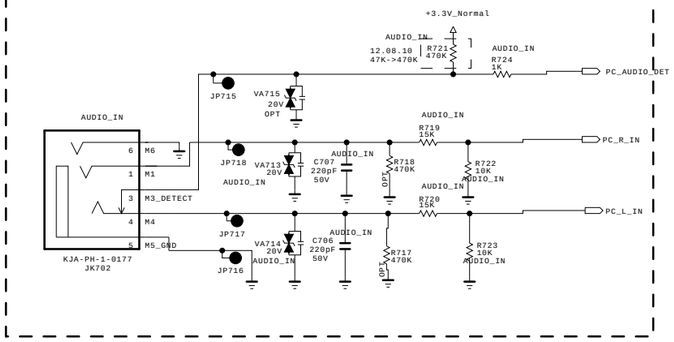
USB(SIDE)

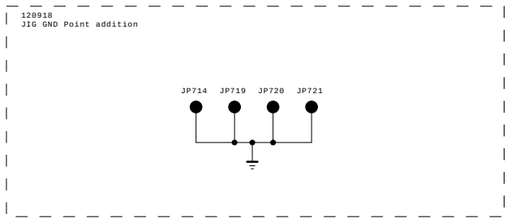


DSUB/SCART Switch

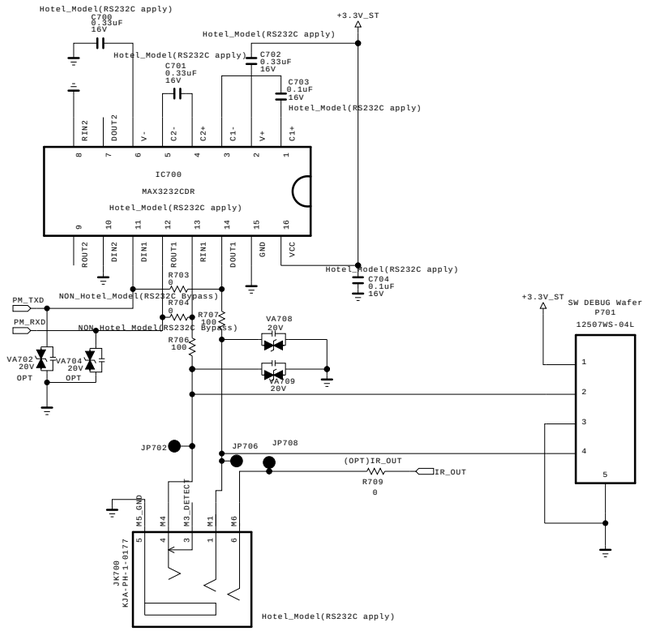


PC AUDIO(SIDE)

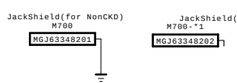




RS232C(SIDE)



Jack Shield (HDMI1, HDMI2, RGB)



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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MODEL	MA55	DATE	2013/05/23
BLOCK	INTERFACE	SHEET	7 /

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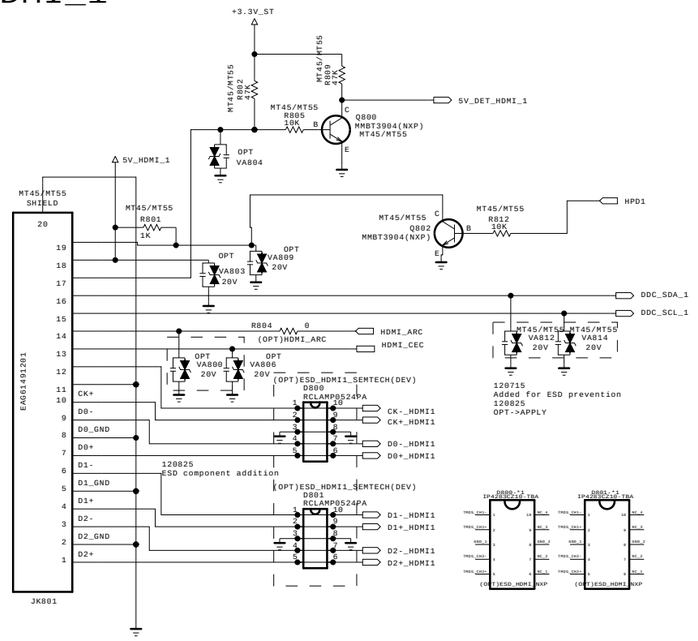
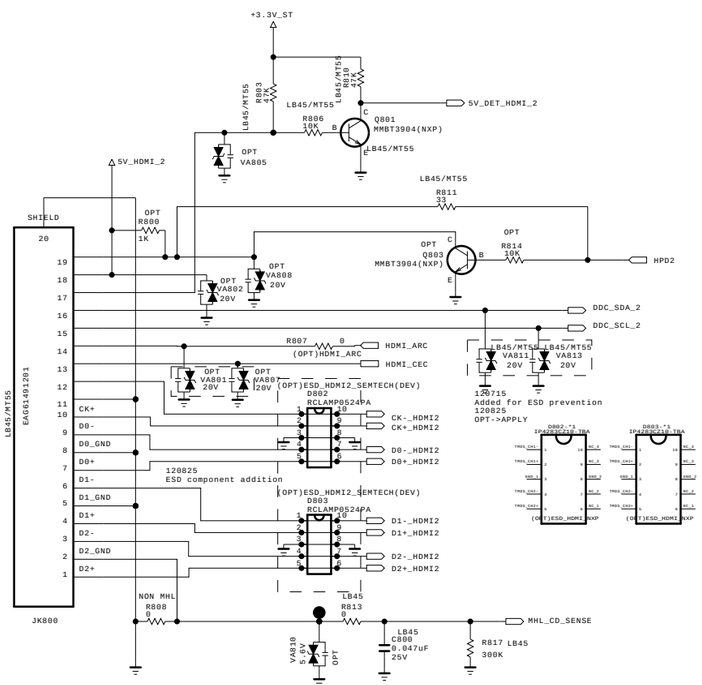
HDMI

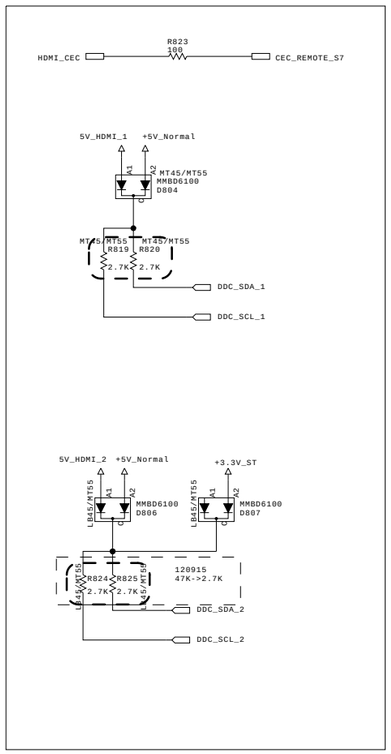
HDMI_1



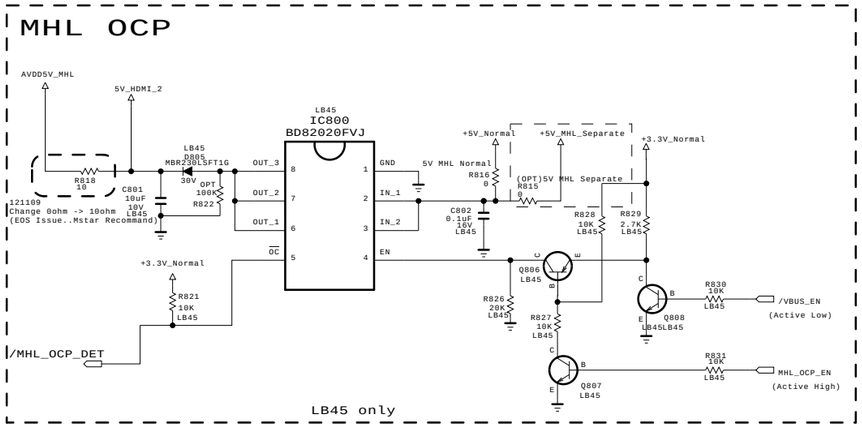
HDMI_2 With MHL



CEC



MHL OCP



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BLOCK	HDMI	SHEET	8 /

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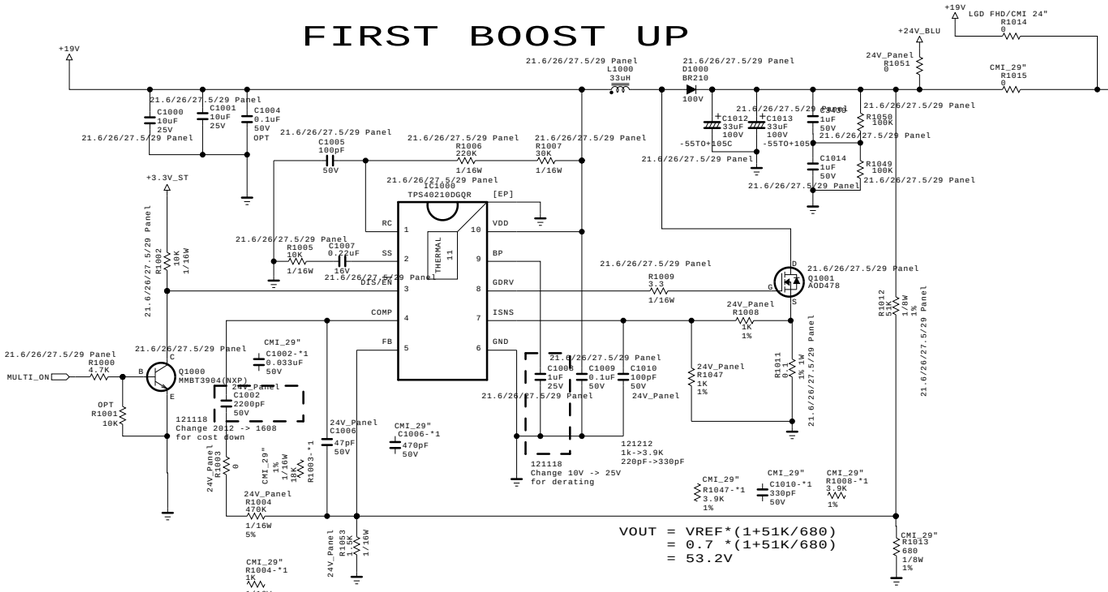
FIRST BOOST UP



REDUCE INDUCTOR TEMP ISSUE

VOUT#1=53.2V

L1001 33uH LGD FHD/CMI

CMI_29" L1002 33uH

LGD FHD/CMI 24" R1054 0 1/8W

LGD FHD/CMI D1001 UF3D(SUZHOU GRANDE)

CMI_29" Q1002 SMK630D

LGD FHD/CMI 24" Q1002-*1 AOD478

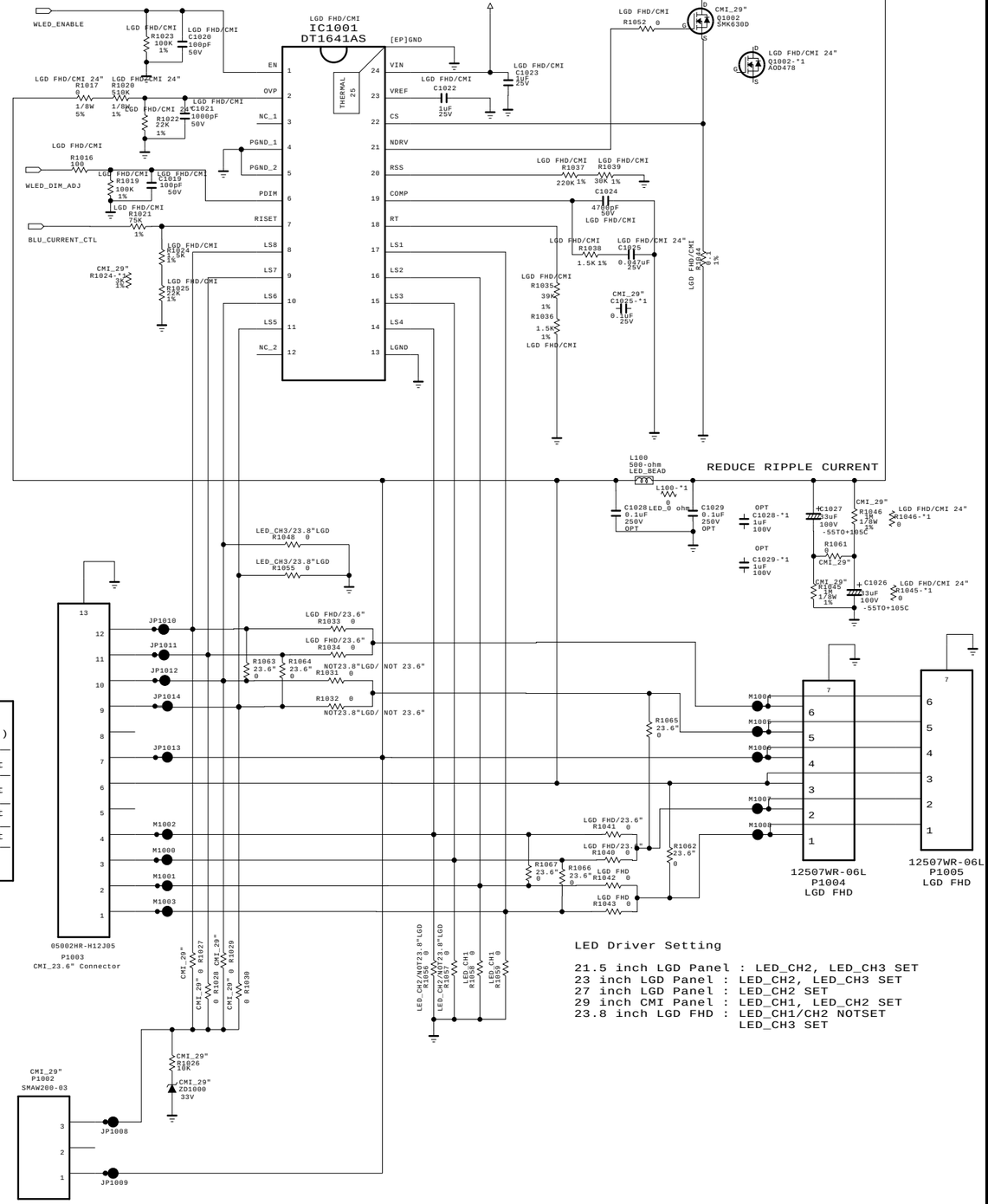
CMI_29" CMI_29"

R1017-*1 120K 1/8W 1%

R1020-*1 270K 1/8W 1%

CMI_29" R1022-*1 6.2K 1%

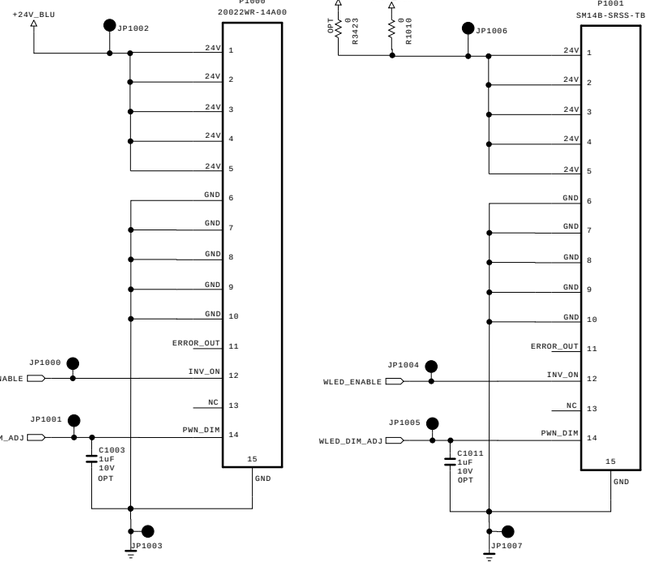
CMI 29"Panel OVP



REDUCE RIPPLE CURRENT

LED Driver Setting

21.5 inch LGD Panel : LED_CH2, LED_CH3 SET
23 inch LGD Panel : LED_CH2, LED_CH3 SET
27 inch LGD Panel : LED_CH2 SET
29 inch CMI Panel : LED_CH1, LED_CH2 SET
23.8 inch LGD FHD : LED_CH1/CH2 NOTSET
LED_CH3 SET



PANEL	Input Voltage	Option (21.6/26 /27.5 /29 Panel)	Option (24V Panel)	Option (LGD FHD /CMI)	Option (LGD FHD /CMI 24")	Option (CMI 29")
CSOT(27.5")	24V	set	set	Not set	Not set	Not set
LGD(21.6/26")	24V	set	set	Not set	Not set	Not set
CMI(23.6")	19V	Not Set	Not set	Set	Set	Not Set
LGD(FHD)	19V	Not Set	Not set	Set	Set	Not Set
CMI(29")	53.2V	set	Not Set	Set	Not Set	Set

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MODEL	MA55	DATE	2013/05/23
BLOCK	LED DRIVER	SHEET	10

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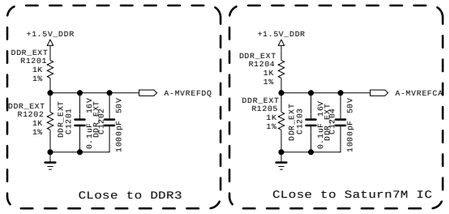
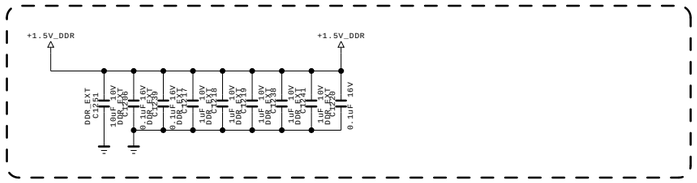
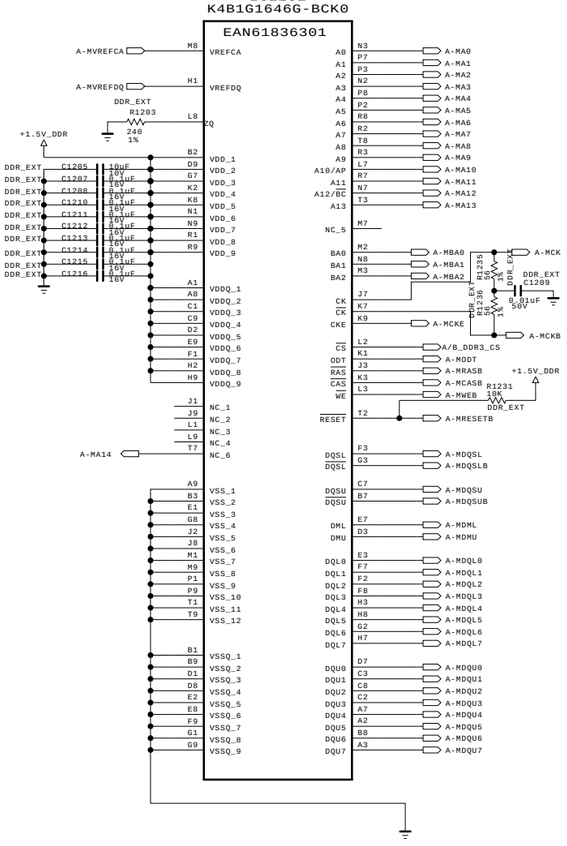
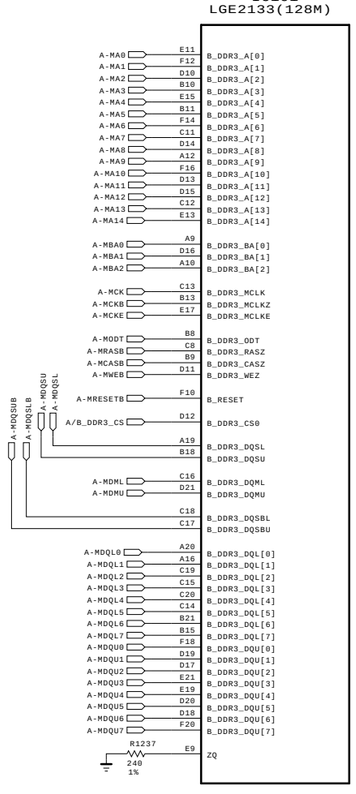




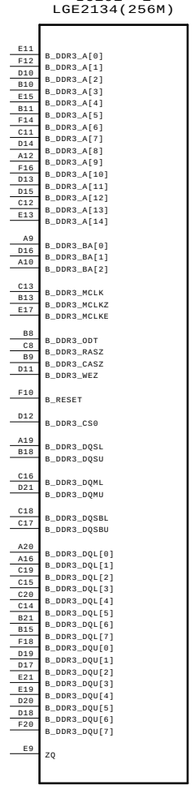
DDR_1600_1G_SS
IC1201
K4B1G1646G-BCK0
EAN61836301



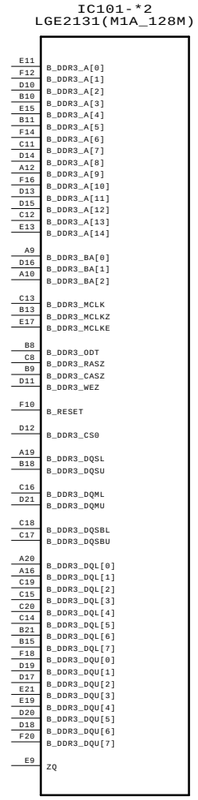
128SCALER
IC101
LGE2133(128M)



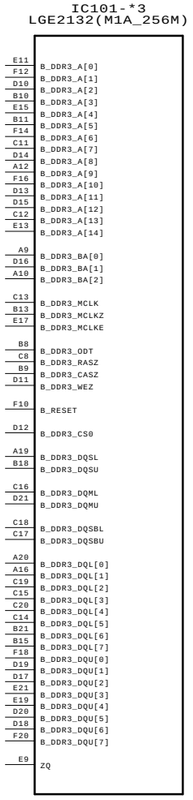
256SCALER
IC101-*1
LGE2134(256M)



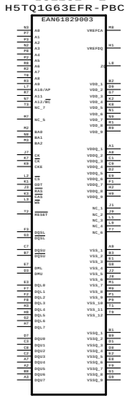
LCD_TV_SCALER_128M
IC101-*2
LGE2131(M1A_128M)



LCD_TV_SCALER_256M
IC101-*3
LGE2132(M1A_256M)



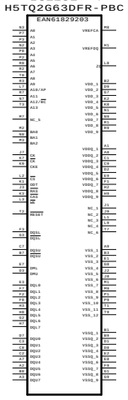
DDR_1600_1G_HYNIX
IC1201-*1
H5TQ1G63EFR-PBC



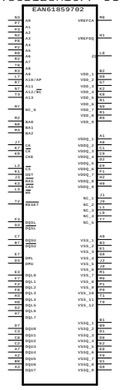
DDR_1600_1G_NANYA
IC1201-*2
NT5CB64M16DP-DH

DDR_1600_2G_SS
IC1201-*3
K4B2G1646E-BCK0

DDR_1600_2G_HYNIX
IC1201-*4
H5TQ2G63DFR-PBC



DDR_1600_2G_NANYA
IC1201-*5
NT5CB128M16FP-DI



MT45/MT55 Scaler,DDR option

	Scaler (internal)	DDR (external)
MT45	EAX65377501 (256MB)	0MB
MT55	EAN62887101 (128MB)	256MB

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MODEL	MA55	DATE	2013/05/23
BLOCK	M1_DDR (2DDR)	SHEET	12

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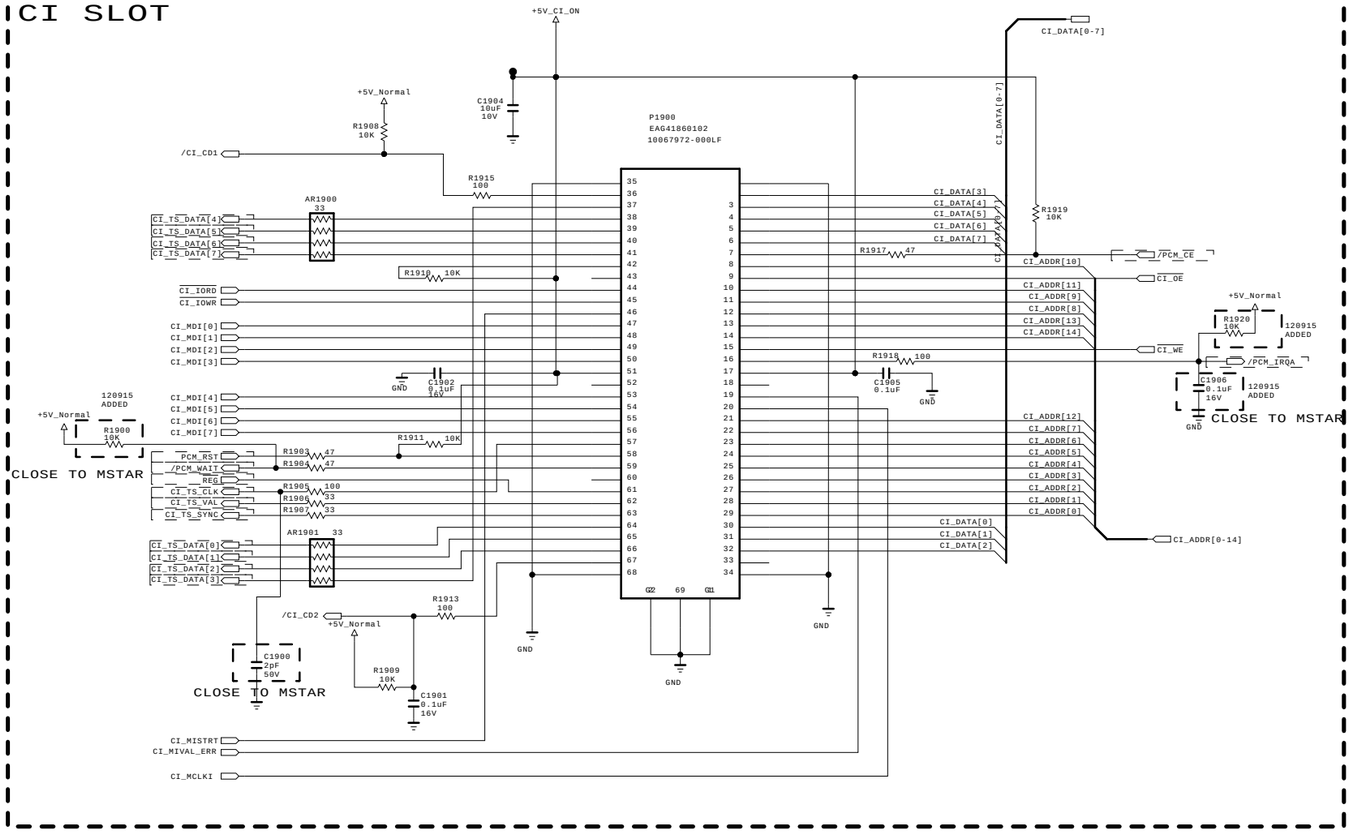
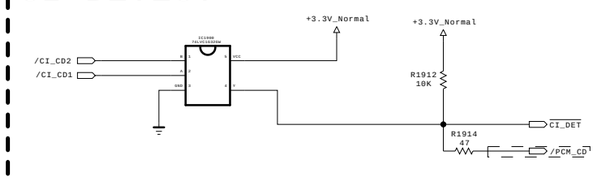
CI Region

* Option name of this page : CI_SLOT
(because of Hong Kong)

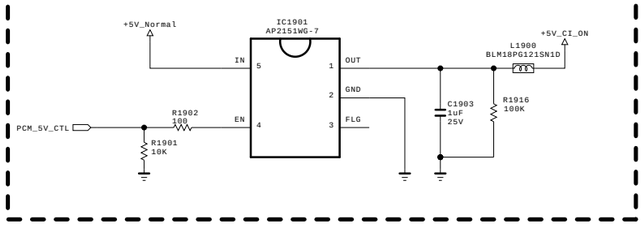
CI SLOT



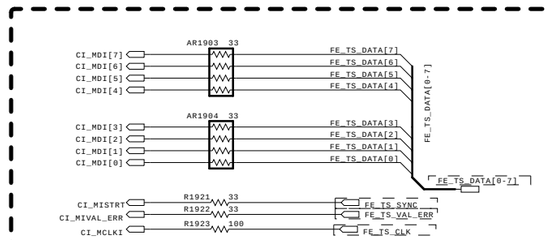
CI DETECT



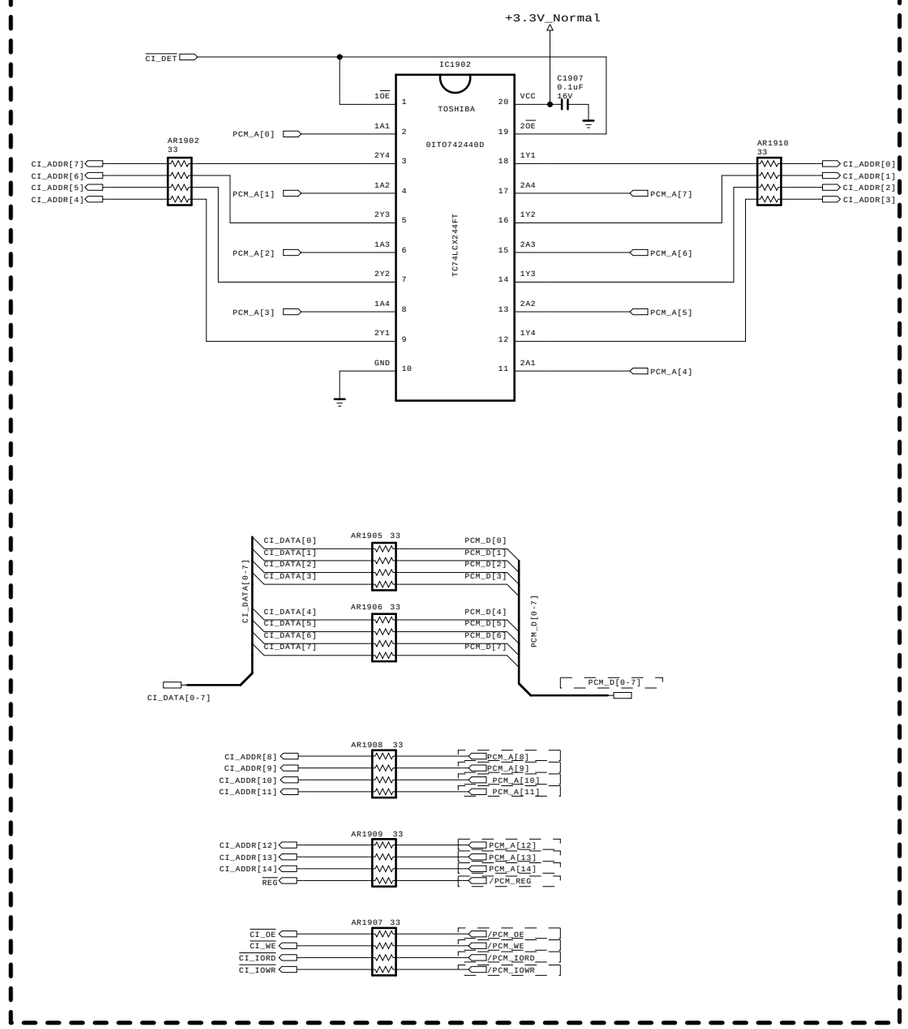
CI POWER ENABLE CONTROL



CI TS INPUT



CI HOST I/F



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MODEL	MA55	DATE	2013/05/23
BLOCK	PCMCI	SHEET	19 /

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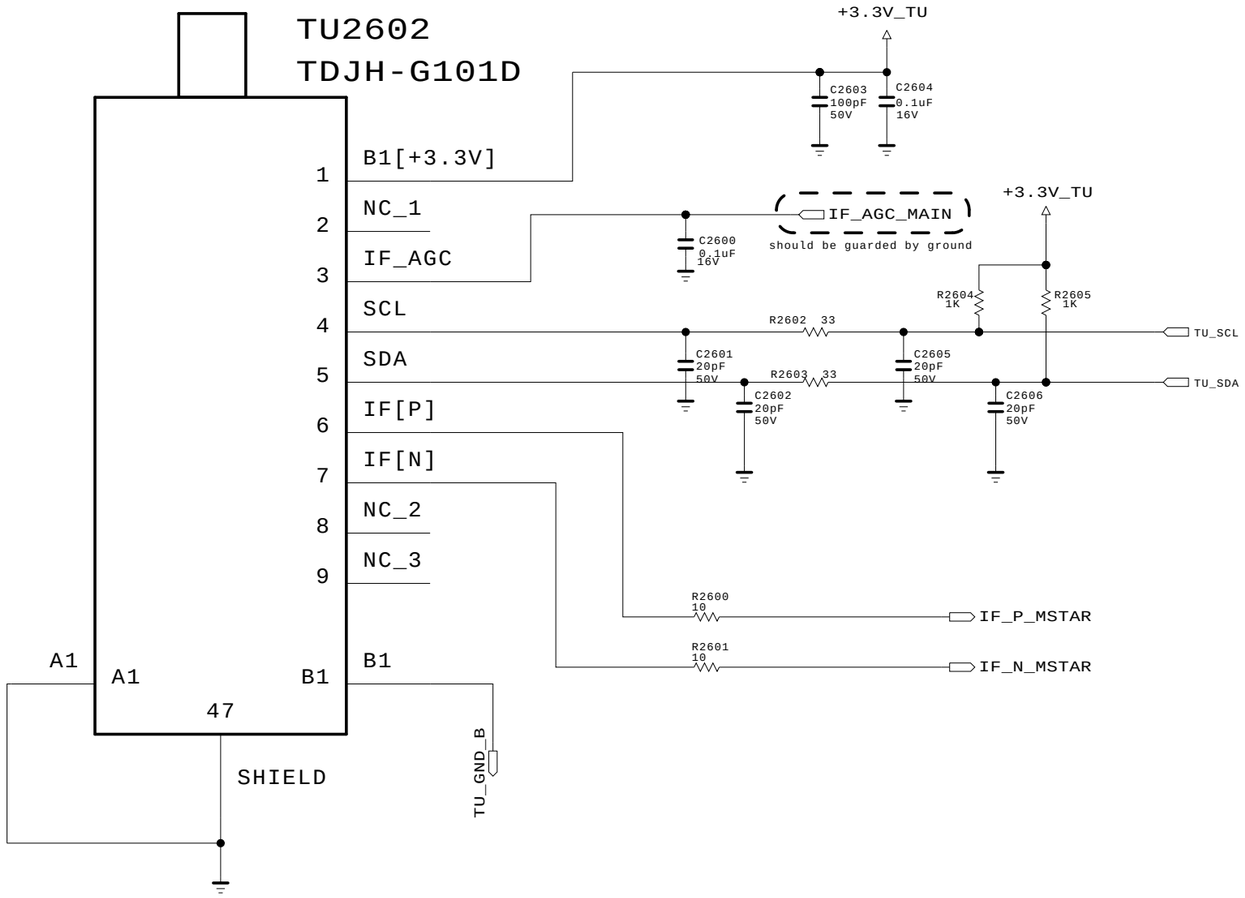
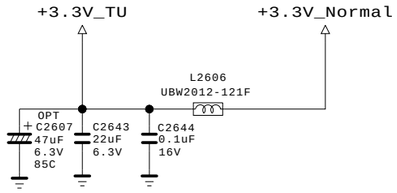
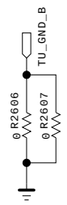
NETCAST4.0_EU_TUNER_BLOCK





GND seperation



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MODEL	MA55	DATE	2013/05/23
BLOCK	TUNER_EU_ERRC	SHEET	8 /

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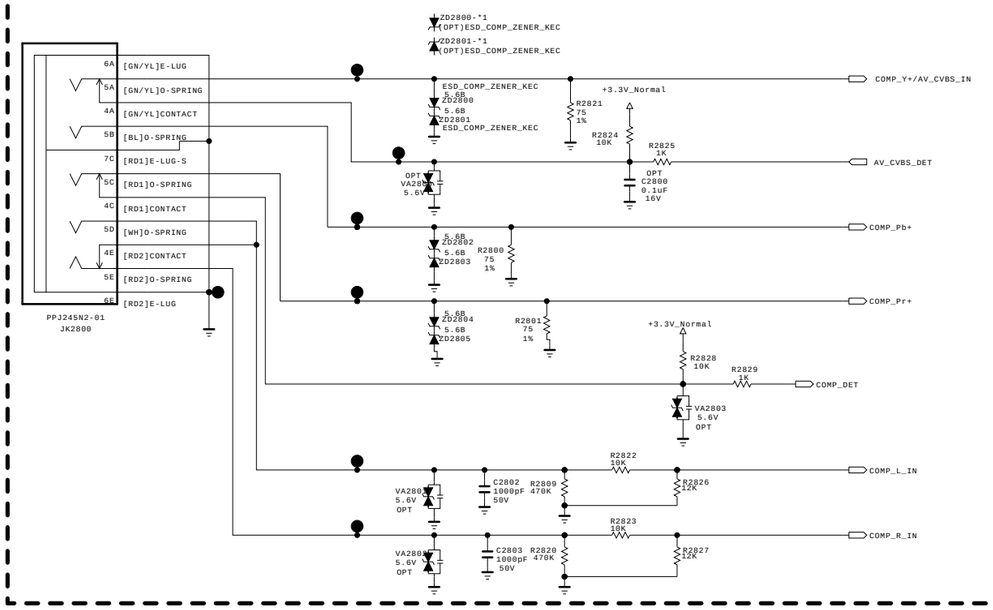
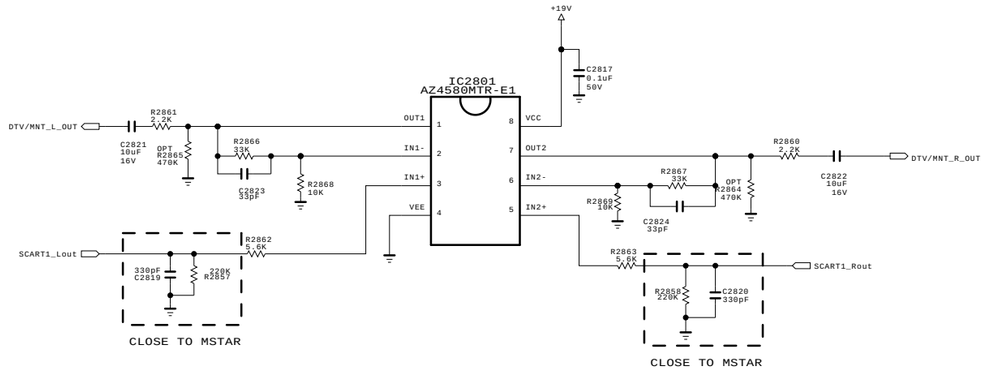
SCART / COMPONENT&COMPSIT

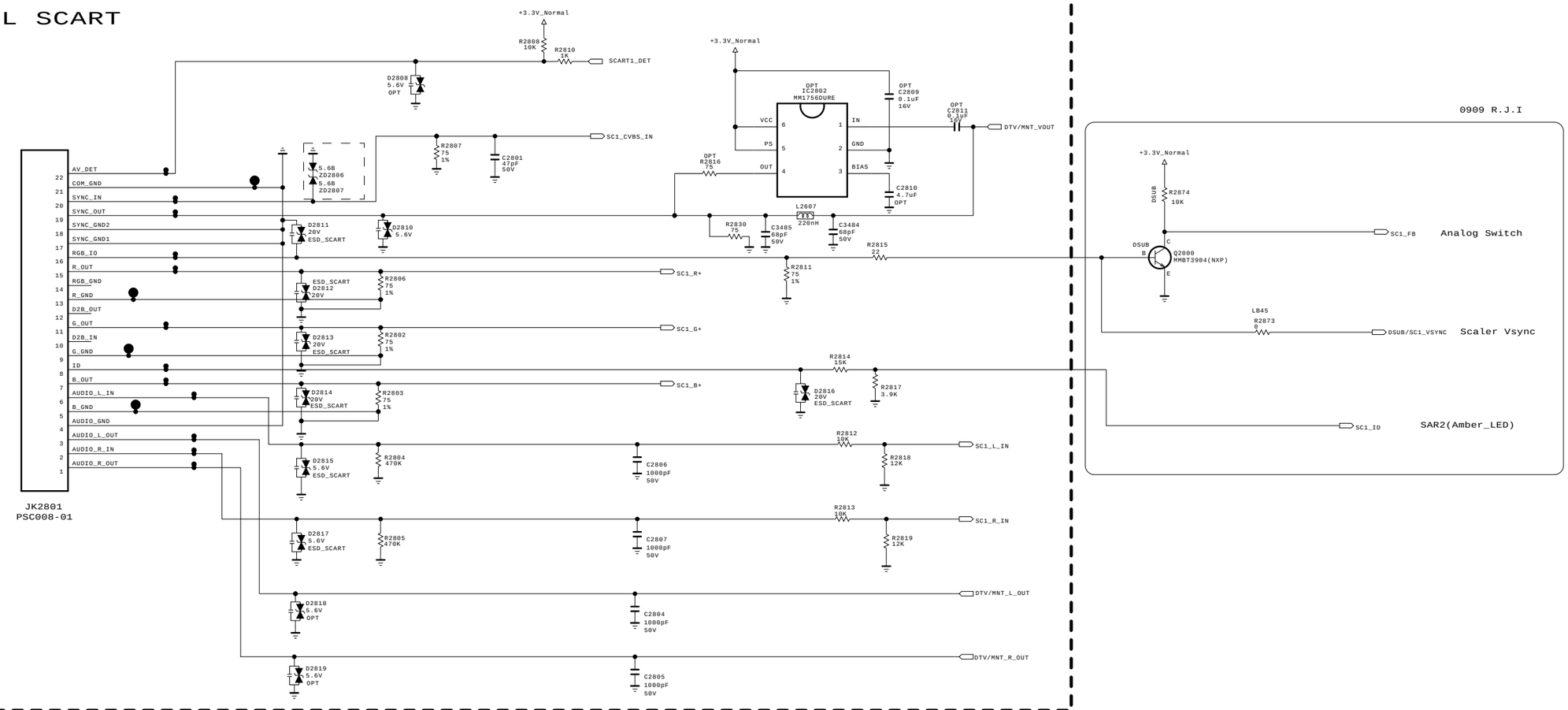
COMPONENT



SCART AMP



FULL SCART



0909 R.J.I

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MODEL	MA55	DATE	2013/05/23
BLOCK	COMPONENT/SCART	SHEET	28

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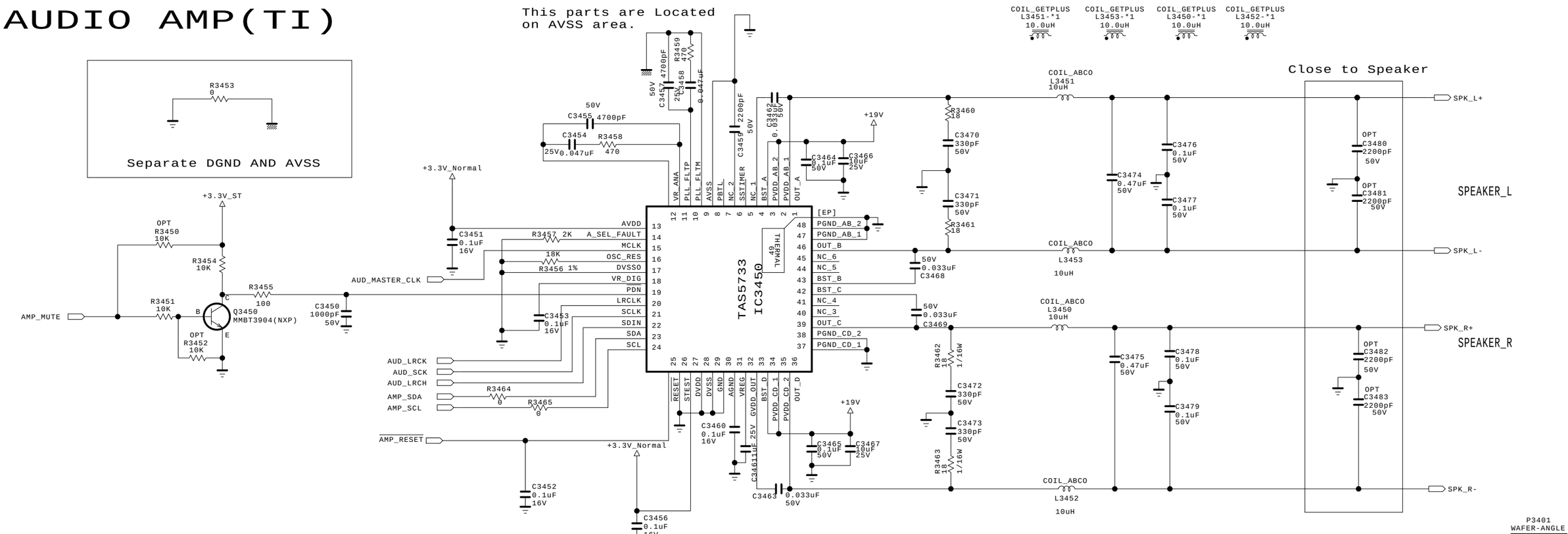
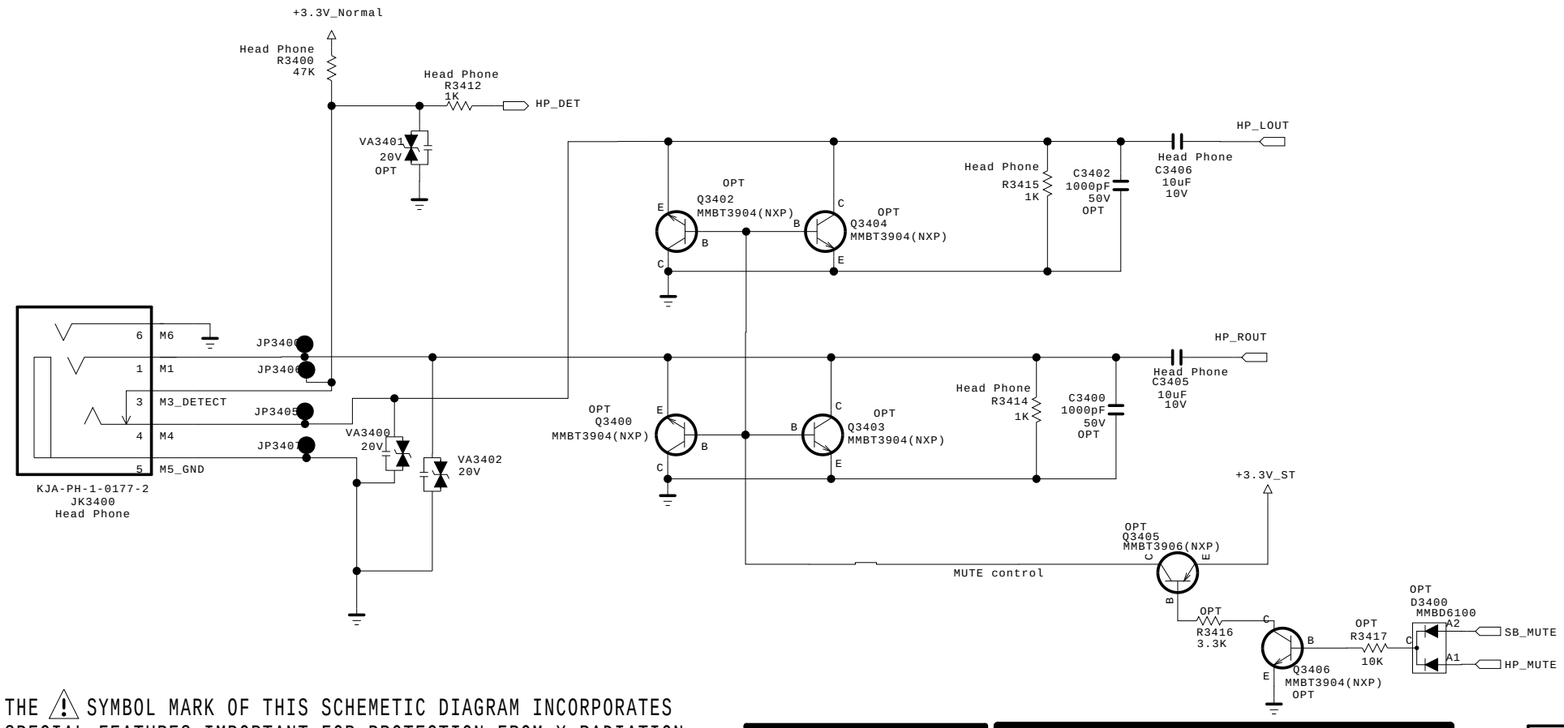
AUDIO AMP(TI)

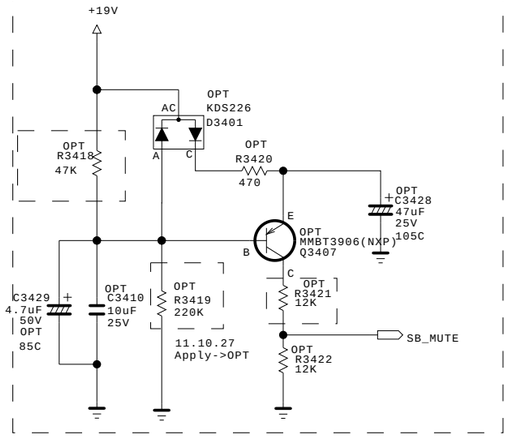
This parts are Located on AVSS area.



Headphone block



Dip Detection Circuit



3K:
With SCART MUTE BLOCK

12K:
Without SCART MUTE BLOCK

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MODEL	MA55	DATE	2013/05/23
BLOCK	AMP_TAS5733/HP	SHEET	34

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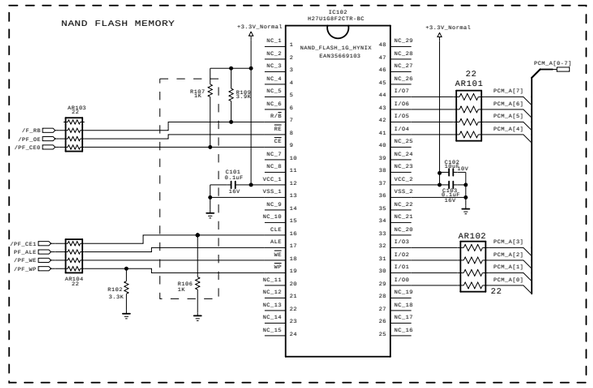
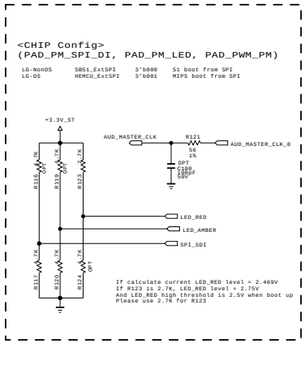
NAND FLASH MEMORY

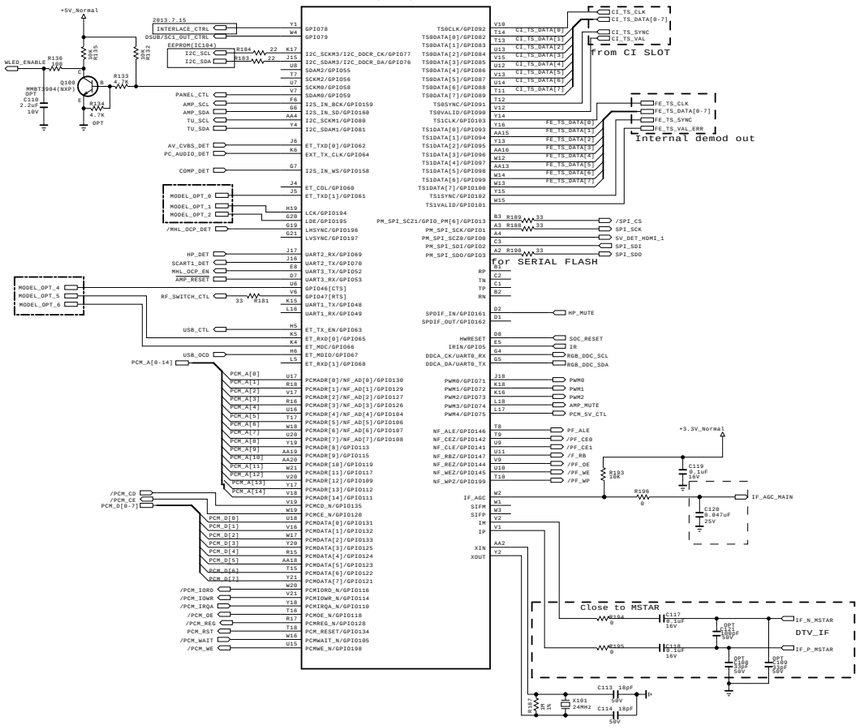


<CHIP Config>
(PAD_PM_SPI_DI, PAD_PM_LED, PAD_PWM_PM)

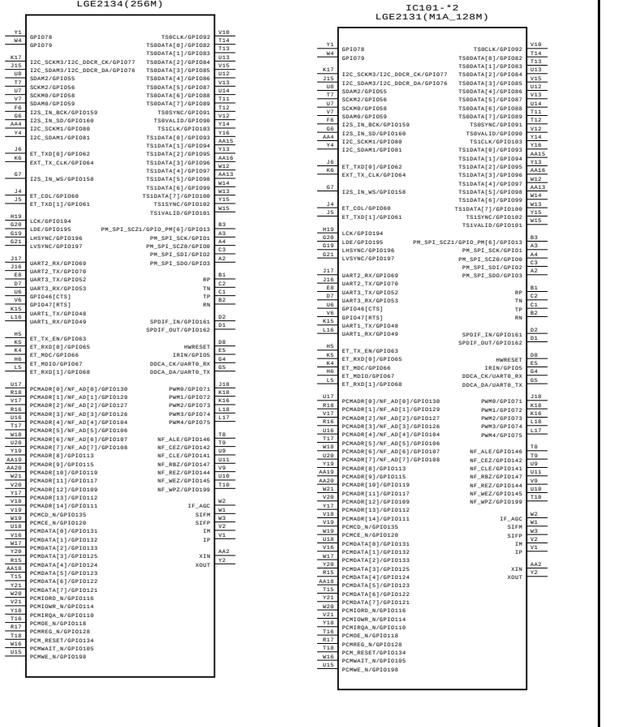
LG-NonOS	SBS1_ExtSPI	3'b000	51 boot from SPI
LG-OS	HEMCU_ExtSPI	3'b001	MIPS boot from SPI



IC101
LGE2133(128M)



IC101-*1
LGE2134(256M)

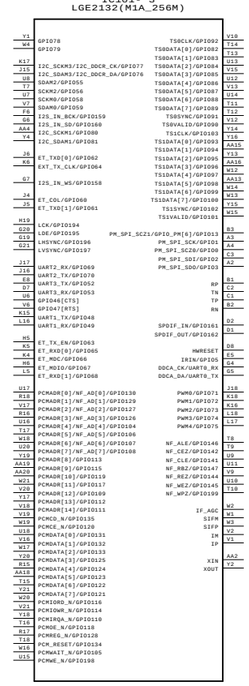


LCD_TV_SCALER_128M

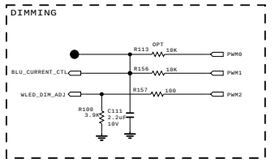
IC101-*2
LGE2131(M1A_128M)

LCD_TV_SCALER_256M

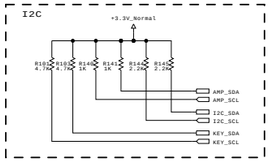
IC101-*3
LGE2132(M1A_256M)



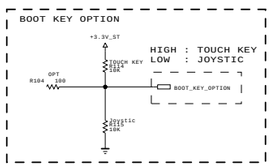
DIMMING



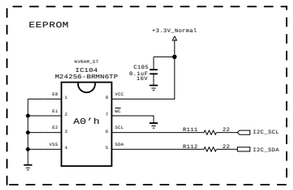
I2C



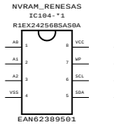
BOOT KEY OPTION



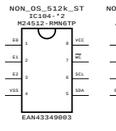
EEPROM



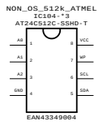
NVRAM_RENESAS



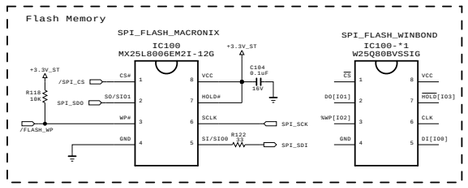
NON_OS_512k_ST



NON_OS_512k_ATMEL



Flash Memory



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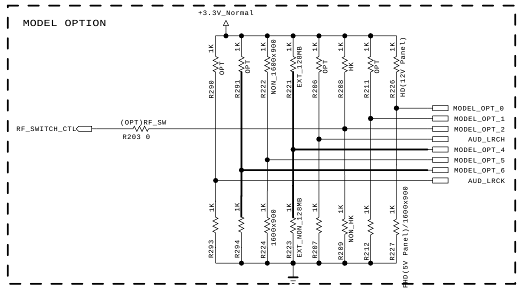


MODEL OPTION

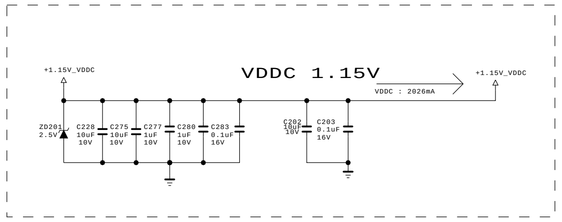
PIN NAME	PIN NO	LOW	HIGH
MODEL_OPT_0	J5	FHD	HD
MODEL_OPT_1	H19	S/W_NON_AJ	S/W_AJ
MODEL_OPT_2	G20	DVB_T/C	DVB_T2/C/S2
AUD_LRCH	G19	NON_M120	M120
MODEL_OPT_4	U6		
MODEL_OPT_5	K5	S/W_TW	S/W_EU/AJ
MODEL_OPT_6	K4	EXTERNAL_NO_DDR	EXTERNAL_DDR
AUD_LRCK	L5	NON_DUALSTREAM	DUALSTREAM

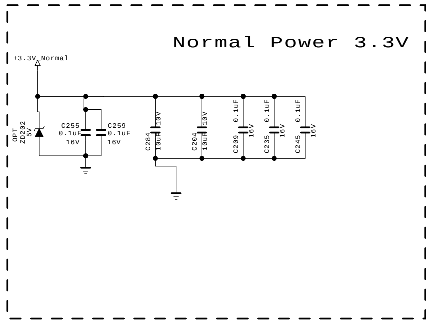
* Dual Stream is only Korea 3D spec

Memory OPTION

Memory INT+EXT	Auto DET	MODEL_OPT_4 EXT 128MB	MODEL_OPT_6 EXT 256MB
128M Only	0	0	0
256M Only	1	0	0
128M+128M	0	1	0
128M+256M	0	0	1
256M+128M	1	1	0
256M+256M	1	0	1

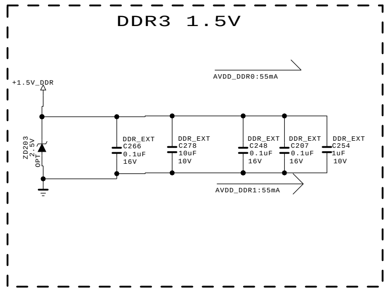
	Area	Scaler	DDR	OPT4	OPT6
MT55/MT75	KR	128	128	1	0
	EU	256	128	1	0
	BR	128?	256?	0	1
	AJ/HK	256	128	1	0
	Etc	256	128	1	0

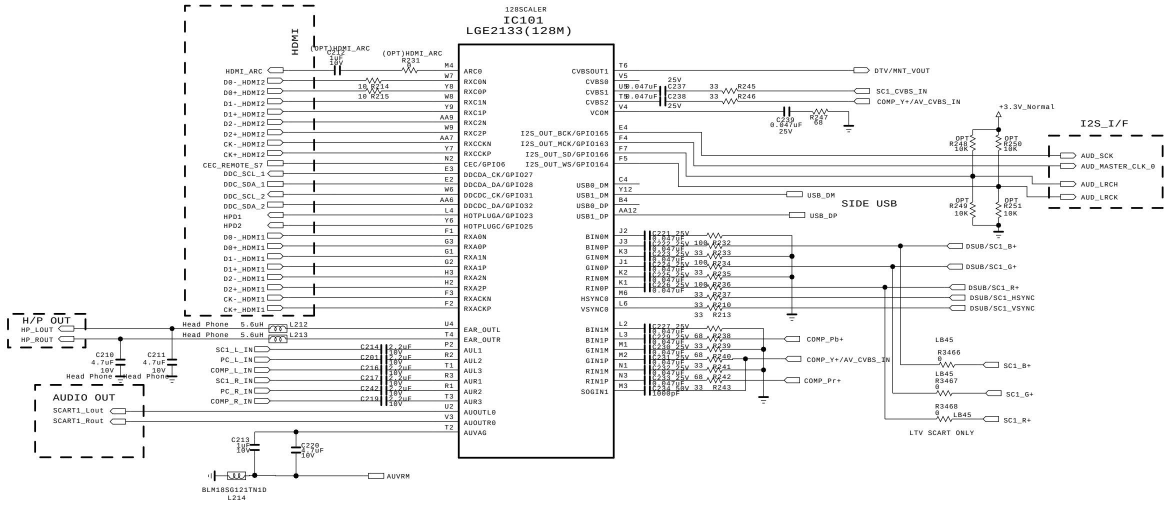


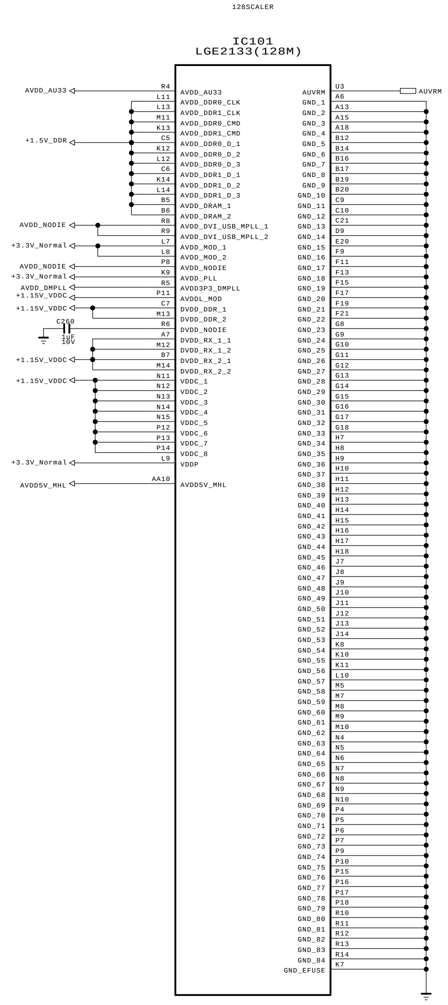


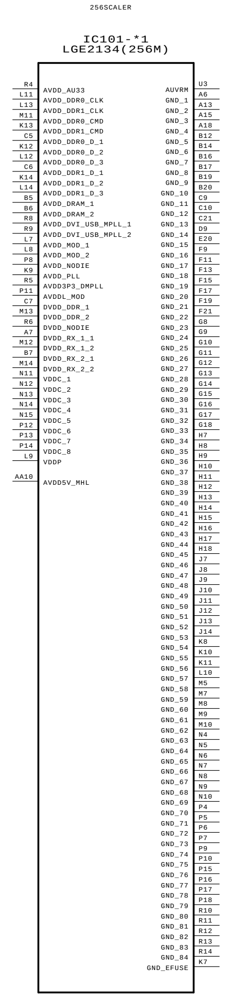
Normal 2.5V

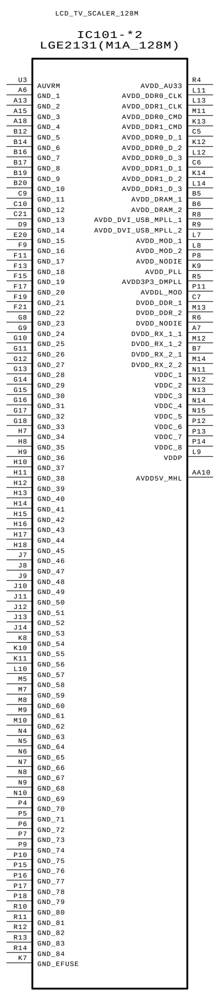
M1A 2.5V inbeded

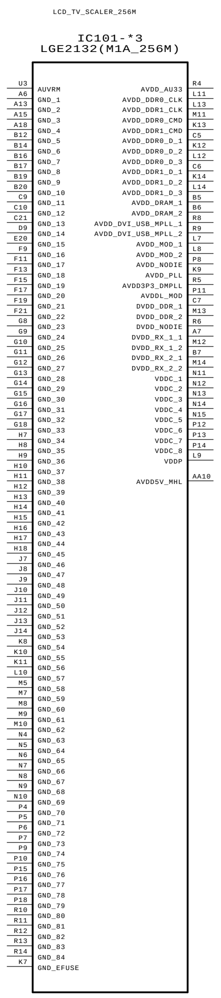


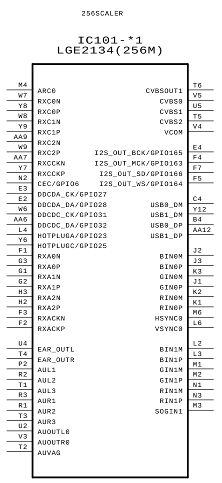


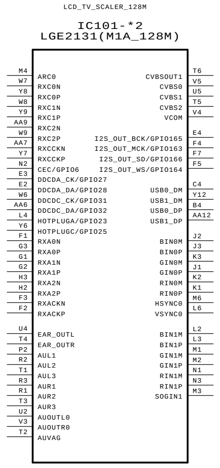


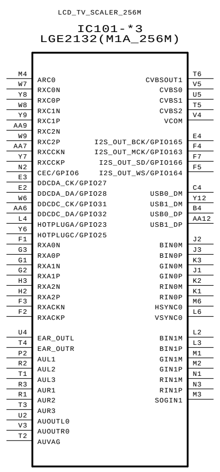


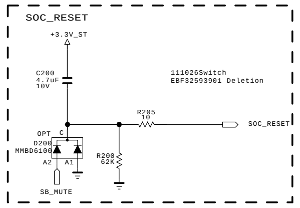


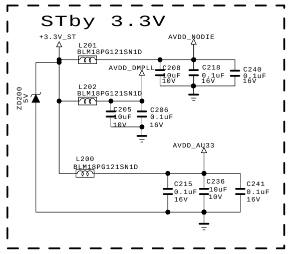












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